ANATOMY

Blood ,lymph and nerve supply summary

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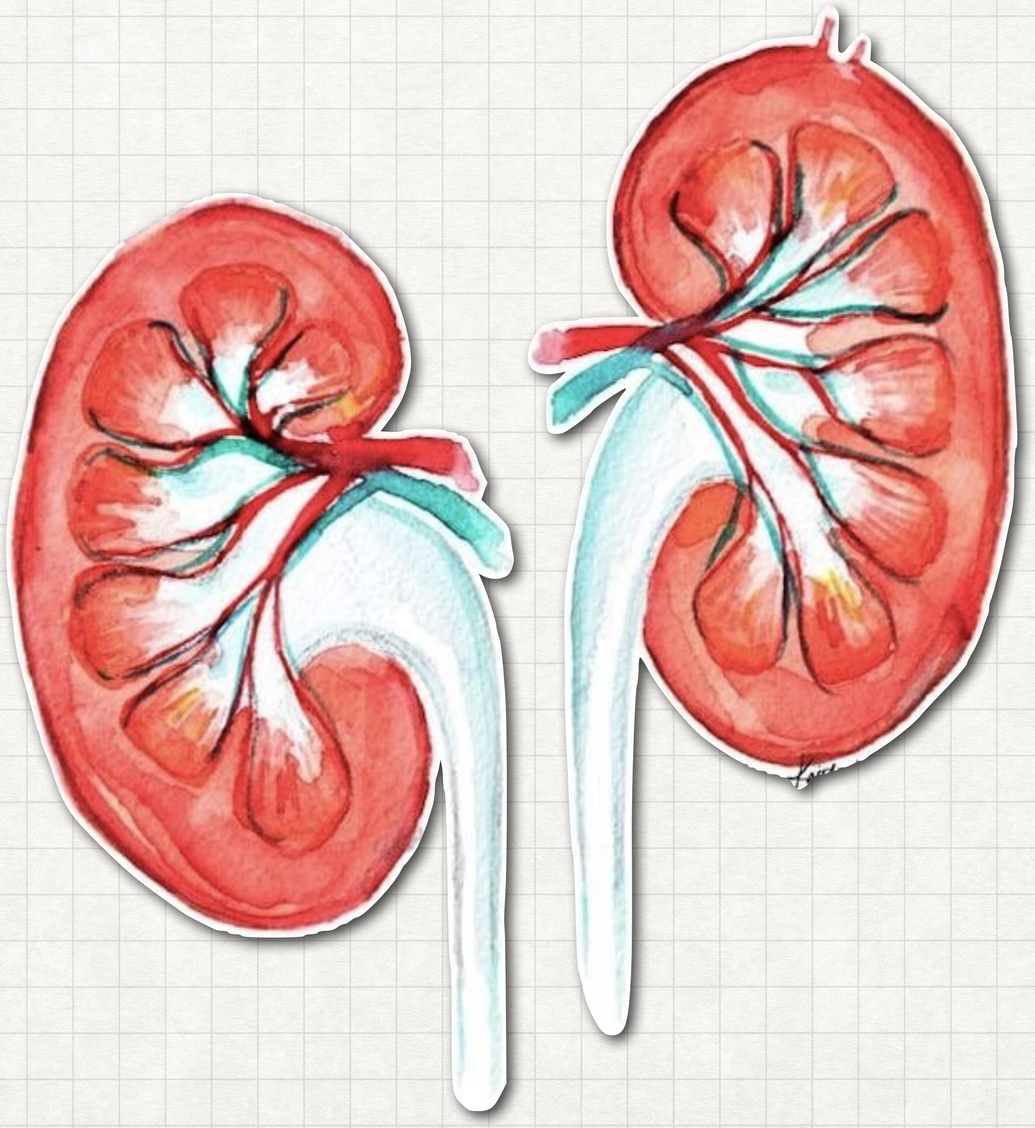

	Levator ani muscle	Coccyges muscle
Nerve Supply	Pelvic surface: 4th sacral nerve (sacral plexus) Perineal surface: perineal branch of the pudendal nerve.	A branch of the 4th & 5th sacral nerves

Kidneys

	Description	Notes
Arterial Blood Supply	Renal artery (from the abdominal aorta , opposite to the upper border of L2)	• The right renal artery is longer , passes **posterior** to IVC. • The renal artery gives inferior suprarenal artery. • Divides into 5 segmental (end arteries). • The cortex receives 10 x more blood than the medulla.
Venous Drainage	Renal vein → IVC	• The left renal vein is longer , passes **anterior** to the aorta below the origin of SMA. • The left renal vein receives left suprarenal & left gonadal. • **Nutcracker syndrome:** compression between SMA & aorta: hematuria due to venous hypertension, rupture of thin walled veins into the collecting system.
Nerve Supply	Renal plexus	• Derived from coeliac plexus and supplemented by the lowest splanchnic nerve . • Pain is referred along distribution of the subcostal nerve T12 (the flank and anterior abdominal wall).
Lymphatic Drainage	Lateral aortic lymph nodes	

Extra note: Hilum order (Ant → Post) : Vein → Artery → Renal pelvis

Ureters

	Description	Notes
Arterial Blood Supply	• Abdominal part: -Renal artery - Abdominal aorta - Gonadal artery - Common iliac artery • Pelvic part: - vesicle arteries - Middle rectal artery - Uterine artery (Females)	
Nerve Supply	• Sympathetic fibers: from T11-L2 segments of the spinal cord • Sensory fibers : from the ureter enter the spinal cord through same segments. • Pain is referred along the distribution of the genitofemoral nerve L1,L2 (groin, anterior aspect of the thigh, scrotum or labium majora)	
Lymphatic Drainage	• Abdominal part: lateral aortic • Pelvic part: common iliac lymph nodes	

Urinary bladder

	Description	Notes
Arterial Blood Supply	Male: - Sup. vesical artery - Inf. vesical artery Female: - Sup. vesical artery - Vaginal artery	• All are branches of internal iliac artery. • Sup.vesicle: gives branches to bladder, ureter and vas deferens (M). • Inf.vesicle: supplies base of the urinary bladder, seminal vesicle, prostate and gives artery to the vas. • Vaginal (F) : base of the urinary bladder and vaginal branches.
Venous Drainage	Vesical venous plexus	• Embedded in the visceral fascia on the inferolatral surfaces of bladder • **Inferiorly:** Male: communicates with the prostatic venous plexus & receives the deep dorsal vein of penis. Female:communicates with the vaginal venous plexus & receives the deep dorsal vein of clitoris. • **Posteriorly:** the plexus is drained by vesical veins which run in the posterior ligaments of the bladder to end in the internal iliac veins.
Nerve Supply	Vesical nerve plexus (from inferior hypogastric plexus)	• Parasympathetic efferents: pelvic splanchnic nerves S2, S3, S4 Contract detrusor and relax sphincter • Sympathetic efferents: L1,L2 Relax detrusor and contract sphincter • Sensory afferents: reach CNS through pelvic splanchnic and sympathetic fibers | record bladder distention and pain.
Lymphatic Drainage	Internal & external iliac lymph nodes	• Neck of the bladder drain to sacral lymph nodes

Urethra	Description	Notes
Blood Supply	• Receives its blood supply from those of prostate and penis	
Nerve Supply	Receives its nerve supply from those of prostate and penis.	• Internal urethral sphincter: autonomic fibers from the inferior hypogastric plexus. • External urethral sphincter: somatic fibers from perineal branch of pudendal nerve of the sacral plexus.
Lymphatic Drainage	• Prostatic & membranous parts: Internal & external iliac • Spongy part: Deep & superficial inguinal lymph nodes	

Scrotum	Description	Notes
Blood Supply	• Cremasteric branch: of the inferior epigastric artery.(inferior epigastric from external iliac artery) • Superficial & deep pudendal branches: of femoral artery • Scrotal branches: of internal pudendal artery.	
Nerve Supply	Ant. 1/3: (Cremasteric reflex) - Ilioinguinal nerve (L1 dermatome) - Genital branch of genitofemoral n. Post. 2/3: - Scrotal branch of pudendal nerve - Post. Cutaneous nerve of thigh (S3 dermatome.)	• Dartos muscle: supplied by sympathetic nerve fibers reaching through the genital branch of the genitofemoral nerve. • Cremasteric muscle: supplied by the genital branch of the genitofemoral nerve.
Lymphatic Drainage	Superficial inguinal lymph nodes	

Testis & Epididymis

	Description	Notes
Arterial Blood Supply	Testicular artery (Branch of the abdominal aorta at L2)	• It descends on the posterior abdominal wall to reach the deep inguinal ring where it runs in the spermatic cord in the inguinal canal. • It supplies the epididymis and enters the testis. • It anastomoses with cremasteric artery and artery of vas.
Venous Drainage	Pampiniform plexus	• It surrounds and accompanies the testicular artery up to the superficial inguinal ring. • In the inguinal canal, it gives rise to a single testicular vein. • The right vein: ends in the IVC. • The left vein: ends in left renal vein (Varicocele is common)
Nerve Supply of the testis	• Sup.spermatic: composed of fibers from the renal & intermesentric plexus follow the testicular artery to the testis. (association with the intermesentric nerve may explain the " kick in the stomach" feeling accompanying testicular injury). • Middle spermatic: arise from the superior hypogastric plexus and pass to mid ureter and travel along the vas to join the **spermatic cord** . (ureter proximity explain pain radiation to the scrotum of an obstructing ureteral stone). • Inf.spermatic: arise from the inferior hypogastric plexus and join the middle spermatic nerve at the prostate-vesical junction. (Some afferent and efferent fibers decussate to the contralateral pelvic plexus).	
Lymphatic Drainage	Lateral aortic lymph nodes	

The Spermatic Cord

It's a group of structures which meet at the deep inguinal ring and traverse the inguinal canal down to the posterior border of the testis .

3 coverings: - Internal spermatic fascia - Cremasteric muscle & fascia - External spermatic fascia

A	• Testicular **A**rtery (from aorta) • Cremasteric **a**rtery (from inferior epigastric) • **A**rtery of vas (from inferior vesical artery)
N	• Sympathetic plexus: around the testicular artery and the artery of vas. • Genital branch of the genitofemoral **nerve**
V	• **V**as deferens • Pampiniform **v**enous plexus • **V**estige of the processus vaginalis
L	**L**ymphatics of the testis and epididymis ascending to lateral aortic lymph nodes and loose areolar tissue.

	Vas Deferens	Seminal vesicles	Bulbourethral glands
Arterial Blood Supply	Artery of the vas • Derived from the Inf. Vesical artery. • It runs in the spermatic cord and anastomoses with the testicular artery	• Inf. vesical artery • Middle rectal artery	Artery of the bulb of the penis
Venous Drainage	Vesical venous plexus	Vesical venous plexus	
Nerve Supply	Prostatic nerve plexus • From inferior hypogastric plexus • Fibers are mainly sympathetic for the process of ejaculation.	Prostatic nerve plexus • Fibers are mainly sympathetic .	Prostatic nerve plexus
Applied anatomy	• Bilateral vasectomy is a common operation for male sterilization.	• Could be felt on rectal examination when enlarged. • Abscess may rupture in the peritoneal cavity.	

Prostate	Description	Notes
Arterial Blood Supply	• Inf. vesical artery • Middle rectal artery	
Venous Drainage	Prostatic venous plexus	• Embedded between the two capsules of the prostate. • It's present only in front and sides of the gland. • **Superiorly:** continuous with the vesical venous plexus. • **Anteriorly:** Receives the deep dorsal vein of the penis. • **Posterolaterally**: is drained to the internal iliac veins which communicates with the internal vertebral venous plexuses by Batson venous plexus.
Nerve Supply	Prostatic nerve plexus (from inferior hypogastric plexus)	
Lymphatic Drainage	Internal & external iliac lymph nodes	

Penis	Description	Notes
Arterial Blood Supply	• All are branches of internal pudendal artery , and all are paired: • Dorsal artery: supplies the skin, fascia and glans. • Deep artery: supplies the corpus cavernous with convoluted helicine arteries. • Artery of the bulb : supplies corpus spongiosum and glans penis.	
Venous Drainage	• Superficial Dorsal vein: (superficial to the facia of the penis), divides into right and left, both of them end in the corresponding superficial external pudendal vein. • Deep Dorsal vein: (deep to the facia of the penis), passes below symphysis pubis to terminate in the prostatic venous plexus.	
Nerve Supply	• Dorsal nerve of the penis: (sensory), is a branch of the pudendal nerve , runs lateral to the dorsal artery of the penis. • Cavernous nerves: (autonomic), arise from the inferior hypogastric plexus, parasympathetic fibers (S2,3,4) , produce vasodilation and erection of penis.	
Lymphatic Drainage	Superficial inguinal lymph nodes	• From glans penis, lymphatics drain **directly** to gland of Cloquet in the femoral canal