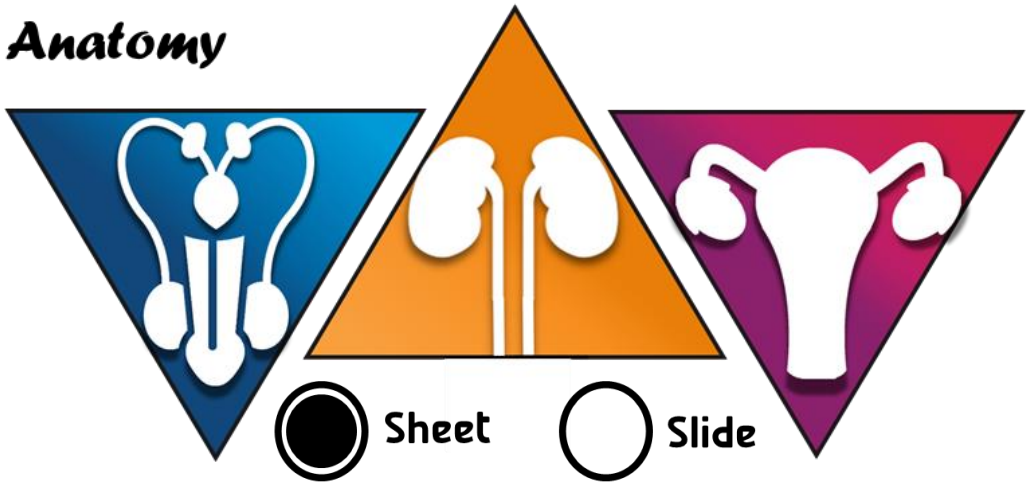
Urogenital system



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Done by: - Rama Nada

Corrected by: - Ensherah Mokheemer

Doctor: - Ahmed salman

We will continue talking about the urinary bladder…

The ligaments of the bladder:

1-Media**n** umbilical ligament:

- Continuous with apex of the bladder (it is the embryonic urachus)
- From the umbilicus to the apex of the urinary bladder

2- Two Media**l** umbilical ligaments:

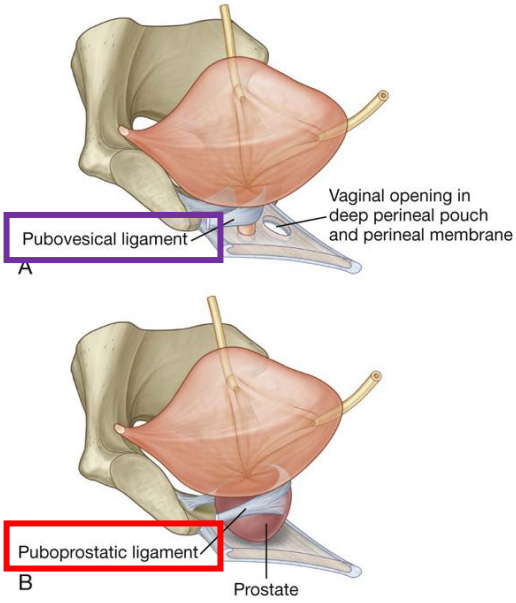
- From the umbilicus to the superior surface of the urinary bladder
- Embryonically, it is the remnant of the fetal umbilical arteries (the distal part of the superior vesical artery which will undergo fibrosis and form the medial umbilical ligament on both side)

3-Lateral ligaments of the bladder:

- Each extends laterally from the side of the base of the bladder (lateral side of the bladder) across the pelvic floor to the tendinous arch (white line; which is thickened obturator fascia) in side wall of the pelvis.
- These ligaments enclose and transmit arteries and autonomic nerves of the bladder.

4-Anterior ligaments (Puboprostatic and pubovesical ligaments):

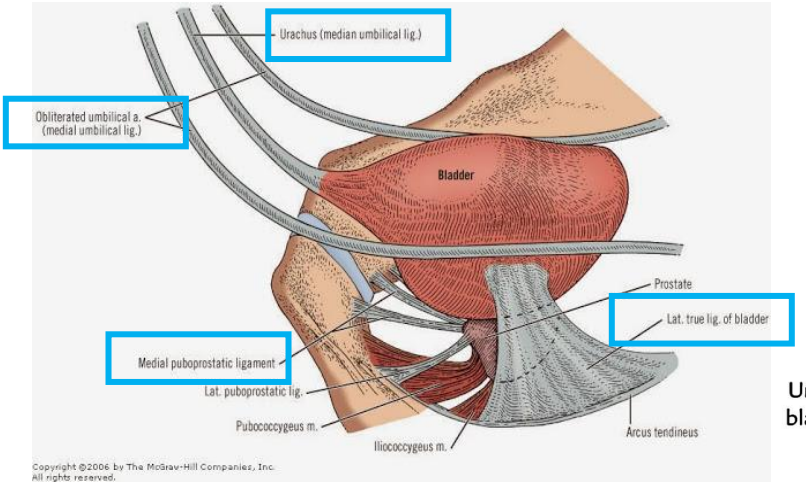
- In the male, the **puboprostatic** ligaments extend from back of the bodies of pubic bones to the anterior surface of the sheath of the prostate and neck of the bladder.
- In the female, the **pubovesical** ligaments extend from pubic bones to the urethra and neck of the bladder.

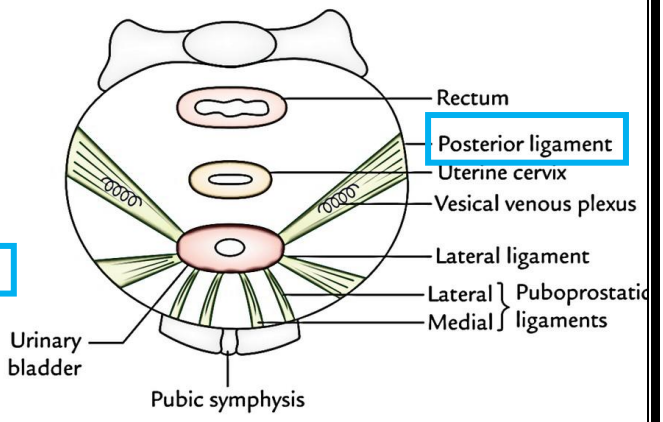


5-Posterior ligaments:

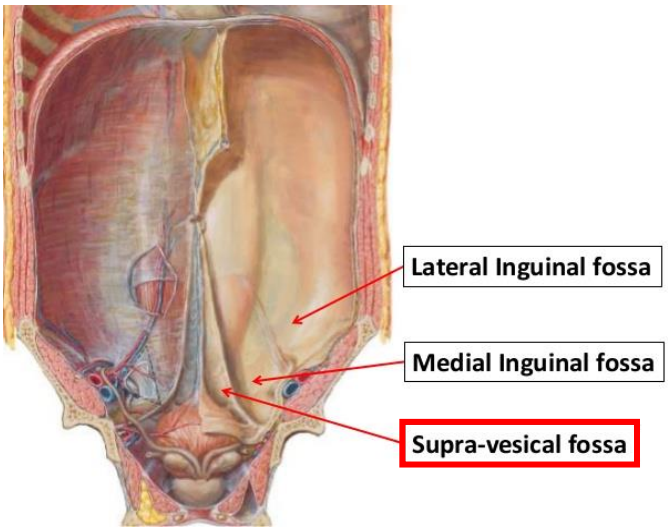
- Each extends backwards from the base of the bladder to the corresponding internal iliac vein.
- They enclose and transmit vesical veins in their way to the internal iliac vein.

All these ligaments are shown in the following figure:





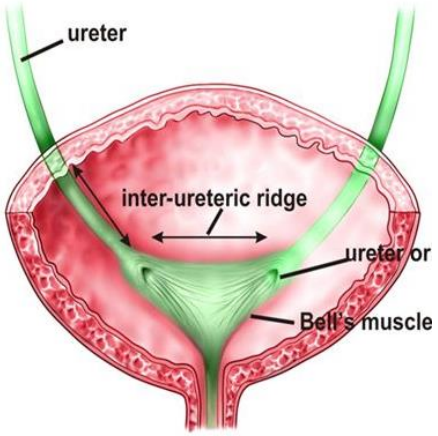
The median and the medial ligament elevate the peritoneum between them forming a fossa called "**Supravesical fossa**"; above the urinary bladder.



Interior of the Urinary Bladder:

-The interior surface of the urinary bladder is rough except for a smooth triangular area called "Trigon"; the angles of this triangle lie between the orifices of the ureters (superiorly) and the internal urethral meatus (inferiorly).

-It is smooth because it has different embryonical origin (it originates from the mesoderm while the rest of the bladder originates from the endoderm.



It has the following special features:

1- Its superior boundary is formed by the interureteric crest (ridge) which connects the two ureteric orifices.
2- Its mucous membrane is always smooth and firmly adherent to the underlying muscle.
3- It is very sensitive and vascular, so that, in cystoscope it appears red violet in colour

Lymphatic Drainage:

- To internal and external iliac lymph nodes.
  From the bladder neck, lymphatics drain directly to the sacral lymph nodes

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In case of urinary bladder injury; if it involves the superior surface (which is covered by peritoneum) the peritoneum will get injured too; **Intraperitoneally**, while if it involves the inferolateral surfaces (which are not covered by peritoneum) the peritoneum will stay intact **Extraperitoneally**, this site of injury is mostly associated with pelvic fracture(pubic bone fracture).

Intraperitoneally	VS	Extraperitoneally
- Usually involves the superior wall of the bladder - Most commonly when the bladder is full - Urine and blood escape freely into the peritoneal cavity		- Usually involves the anterior part of the bladder wall below the level of the peritoneal reflection - It most commonly occurs in fractures of the pelvis - The patient complains of lower abdominal pain and blood in the urine (hematuria)

Urethra:

Clinical case:

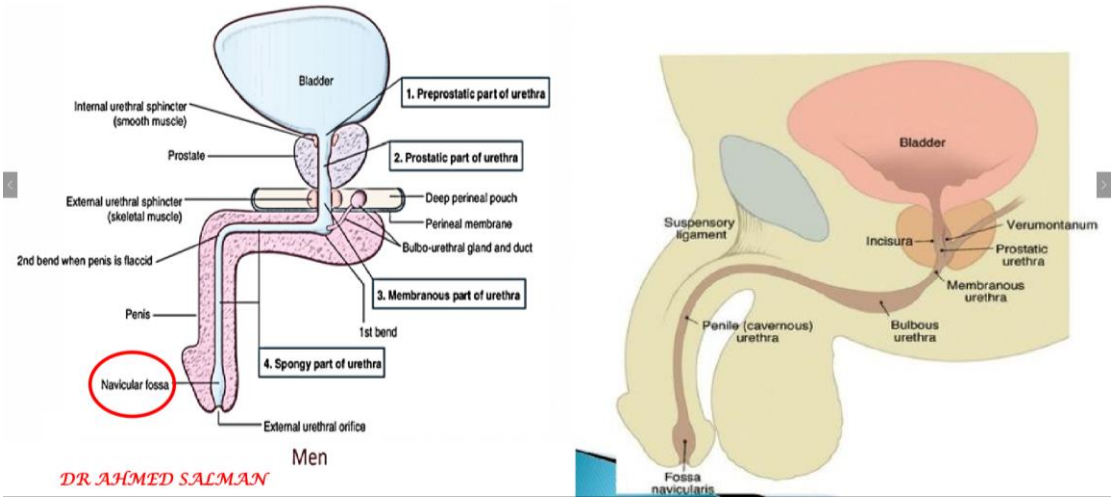
During inserting a Foley catheter in a male patient, you feel a resistance. WHY AND WHAT YOU WILL DO?

What is the difference in sizes between the cannula and Foley catheter?

Note: catheter is not used only for patients with urinary problems, normal people who undergoes long operations must be catheterized also, even in the caesarean section as the patient will not be able to go to the toilet.

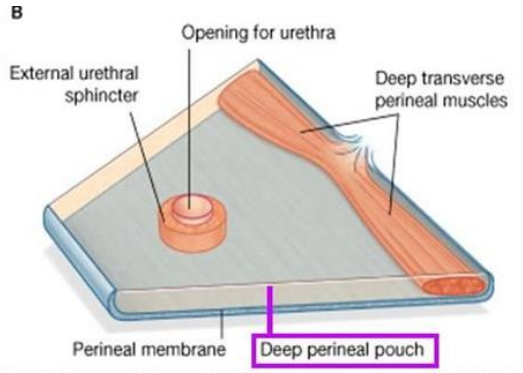
Male Urethra:

It is divided into 4 parts; the first and the second parts are in the pelvis, the third and fourth parts are in the perineum.

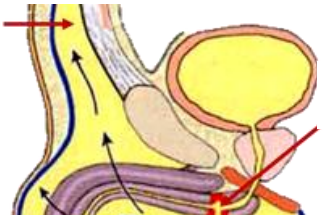


Levator ani muscle forms the floor of the pelvis, below it there is a horizontal membrane called “Perineal membrane”, these two structures along with the skin form two pouches:

1- Deep pouch between the levator ani and the perineal membrane.



2- Superficial pouch between the perineal membrane and the skin.



Parts of the Urethra

	First part: preprostatic part of urethra	**Second part:** prostatic part of urethra	**Third part :** membranous part of urethra	**Fourth :** spongy part of urethra
Length	1-1.5 cm	3 cm	2 cm	15 cm
Site	between neck of the bladder and the base of the prostate	traverses prostate from base to apex	runs in deep perineal pouch	bulb of penis and corpus spongiosum (Superficial Perineal Pouch)
Size		it is the widest part of urethra	it is the least dilatable part	
Special features	It is surrounded by internal sphincter	Urethral crest Seminal colliculus Prostatic sinuses	surrounded by external urethral sphincter	-Dilated at its beginning to form to form **intrabulbar fossa** and at termination in glans penis to form the **navicular fossa.** -The bulbourethral glands open into its beginning

Notes about the previous table:

- Numbers aren't for memorization, but you must know the longest part, the shortest and so on.
- The membranous part is called so because it penetrates the perineal membrane.
- The spongy part is called also "penile part" as it passes through the penis.
- About the two dilation in the penile part; interbulbar fossa is in the bulb of penis, while navicular fossa is in the terminal part of the penis and end in **the external urethral meatus**.
- External urethral meatus is the narrowest part of urethra, and a calculus may lodge there (easily removed using forceps).
- So, the urethra extends from the neck of the bladder to the external urethral meatus.

Around the urethra there are two sphincters; one is internal & the other is external.

Internal urethral sphincter	External urethral sphincter
surrounds the neck of urinary bladder and the first (preprostatic) part of the urethra	surrounds the third (membranous) part of the urethra
Involuntary sphincter	Voluntary sphincter
Smooth muscle	Skeletal
Supplied by ANS (from the inferior hypogastric plexus)	Has somatic innervation (from the pudendal nerve)
Well developed in both male and female	More developed and powerful in males
It maintains continence of urine it has a genital function in male, it prevents reflux of semen into the urinary bladder during ejaculation	It maintains continence of urine

Now we will return to our case:

During catheterization, on reaching the membranous part of the urethra, a slight resistance is felt because of the tone of the urethral sphincter and the surrounding rigid perineal membrane (the least dilatory part), here pass the catheter gentilly to avoid urethral rupturing.

Vessels Nerves and Lymphatics of the urethra :

Urethra receives its blood and nerve supply from those of prostate and penis.

Lymphatics:

From the *prostatic and membranous* parts to **internal and external iliac.**

lymph nodes From the *spongy* part to **deep and superficial inguinal lymph nodes**.

Urinary Retention

It is more common in **male** due to a benign or malignant enlargement of the prostate or acute urethritis or prostatitis .

The only anatomic cause of urinary retention in **females** is acute inflammation around the urethra (e.g., from herpes).

Special features of prostatic part of urethra:

Urethral crest:

- It is a median longitudinal elevation in the mucous membrane of its posterior wall.

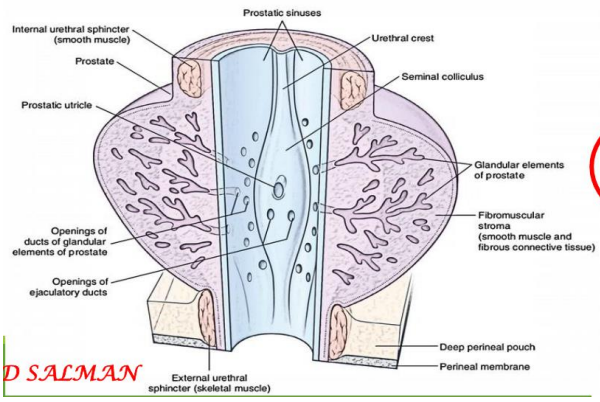
Seminal colliculus (verumontanum):

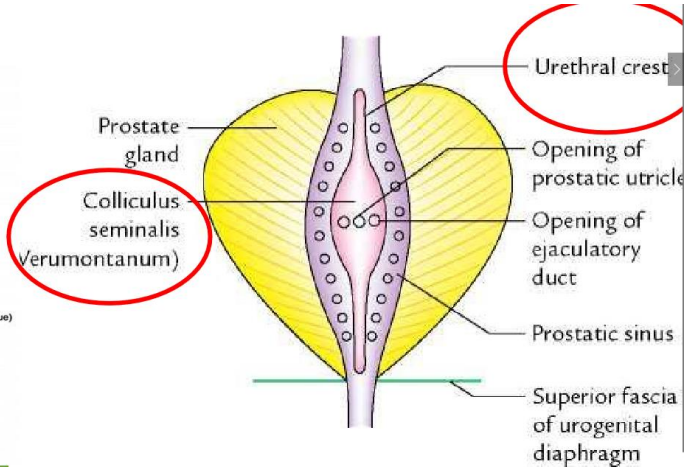
- It is a prominence at the middle of the crest.
- It has three openings; the opening of the prostatic utricle in its middle (embryonic remnant with no function), and the openings of the two ejaculatory ducts on the sides.

Prostatic sinuses:

- Each is a shallow depression on the side of the urethral crest.
- Each receives 15-20 prostatic ducts.

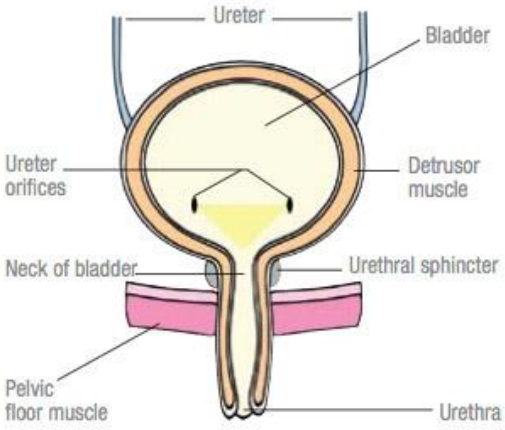
The following figures show the features of the prostatic urethra;





Female Urethra:

The length is 4 cm.



- It begins at the internal urethral meatus at the neck of the bladder.
- It traverses the deep perineal pouch to end at the external urethral orifice in the vestibule anterior to the vaginal orifice.
- It is embedded in the anterior wall of the vagina.
- On each side of the urethra, the mucous membrane of the urethra presents a number of small mucous glands called the paraurethral glands which correspond to the prostate in the male.

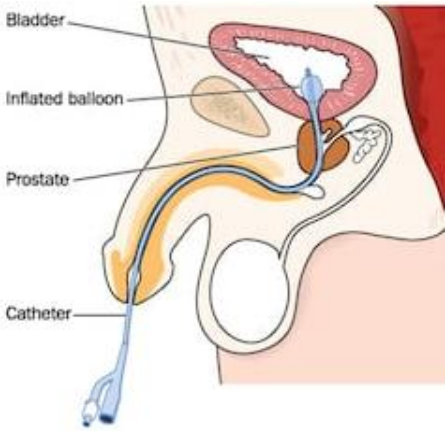
The following information is from slides and not mentioned by the doctor:

<u>Clinically Significant Differences Between Male and Female Urethrae:</u>

- The female urethra is distensible because it contains considerable elastic tissue, as well as smooth muscle.
- It can be easily dilated without injury.
- Infections of the urethra, and bladder, are more common in women because the female urethra is short, more distensible, and is open to the exterior.

Catheterization:

There are two types of catheters:



- The first one has inflatable balloon with two openings on its terminal part (one for balloon inflation and the other for urine passage), one you set the catheter you inflate the balloon to stabilize it inside the bladder.

- The second one is called Condom catheter, it is used for short term as it has many problems, such as: irritation, dislodgement and leakage.

The doctor discussed the difference between catheter and canula not for exam purpose, you can refer to minute 25 in the record if you are interested :))

Male Genital System

It is composed of external structures, such as: scrotum, testes, epididymis & spermatic cord, and internal structures, such as: glands (prostate, seminal vesical, ejaculatory duct & vas deference).

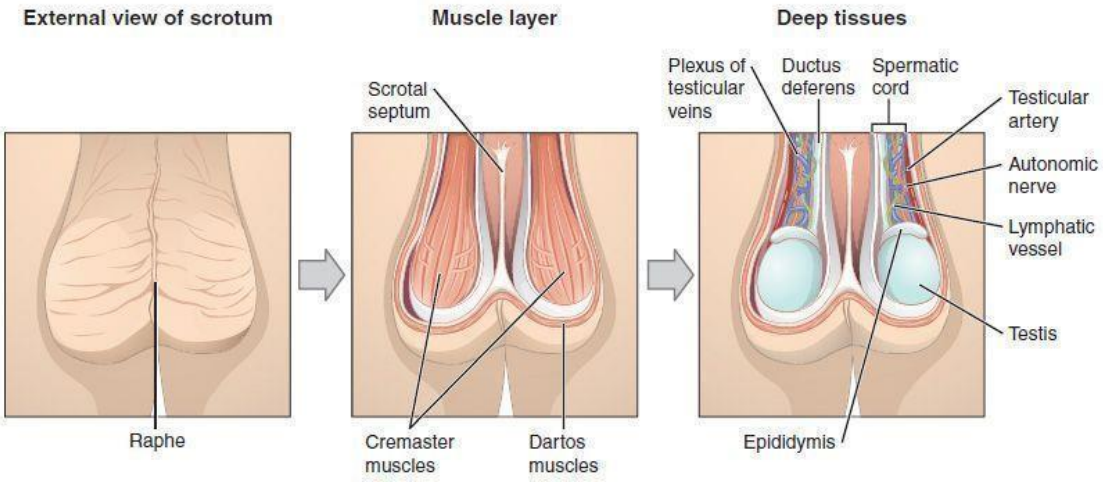
Scrotum:

- It is pouch of skin outside the body.
- It contains the testes and the epididymis (epididymis transmits sperms from testes to vas deference).
- It contains also the Spermatic cord which is a cord like structure, formed by vas deference and runs down from the abdomen to each testicle.
- Externally, there is a median line called “median scrotal raphe”; it appears due to fusion of two folds in the embryo.

Remember: the abdominal wall has two superficial fascia layers (superficial fatty layer & deep membranous layer), but it doesn’t have deep fascia.

- In the scrotum there is no superficial fatty layer; to keep the scrotal temperature lower than the body temperature for spermatogenesis, instead of it there is muscle called “dartos muscle”.
- The deep membranous layer is present in the scrotum, but it is called “colles fascia” instead of scarpa's fascia in the abdomen.

- In the scrotum there are two muscles: dartos muscle & cremasteric muscle.



Dartos muscle is smooth muscle and has autonomic innervation (genital branch of genitofemoral nerve; it is somatic nerve but carries autonomic fibers too), while **Cremasteric muscle** is striated muscle, it is extension of the abdominal internal oblique and innervated by the genital branch of genitofemoral nerve (somatic innervation).

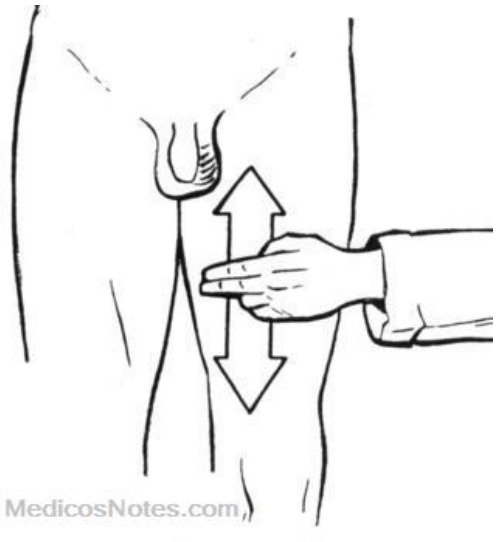
These two muscles are found in the wall of the scrotum, and their function is thermoregulation (in cold weather they contract and pull the testis upward, while in hot weather they relax and pull the testis downward to keep them away from body temperature).

Cremasteric reflex:

This reflex is elicited by lightly stroking or poking the superior and medial (inner) part of the thigh. The normal response is an immediate contraction of the cremaster muscle that pulls up the testis ipsilaterally (this reflex is usually tested in infants).

The afferent (sensory) limb of the reflex: ilioinguinal nerve

The efferent (motor) limb of the reflex: genital branch of genitofemoral nerve.



Don’t forget to refer to the slides

Sorry for any mistake

Best of luck