Biology 224 Human Anatomy and Physiology II Week 9; Lecture 2; Wednesday Stuart Sumida

Development and Structure, of the Reproductive System

Don't forget the relationships of the structures of the layers of the pelvis and perineum relative to body wall and more internal structures...











Development of the Reproductive Systems

Like the kidney apparatus:

the gonads develop in a RETROPERITONEAL position next to the dorsal body wall.
they are derived from intermediate mesoderm.



In the Developing Human Female:

A specialized collecting tube runs from the ovary to the embryonic cloaca.

 It is plastered over the ovary so that when an egg is shed from the ovary, it doesn't escape into the coelom.

 This collecting tube – the PARAMESONEPHRIC
 DUCT -- is positioned just
 lateral to the mesonephric
 duct of the developing
 kidney.

Developing Human Female (Continued):

The caudal ends of the right and left paramesonephric ducts fuse near their entrance into the embryonic cloaca to become the UTERUS AND VAGINA.
The remaining unfused parts are then known as the UTERINE TUBES, or more commonly the FALLOPIAN TUBES.



SUPPORTING LIGAMENTS OF THE OVARY AND UTERUS

BROAD LIGAMENT – Sheet of connective tissue supporting uterus laterally, as well as fallopian tube and ovary out to lateral body wall.

OVARIAN LIGAMENT – connective tissue strap/band anchoring ovary to lateral uterine wall.

MESOSALPINX – connective tissue sheet spanning distance between ovarian ligament and fallopian tube.



Ovarian ligament





In the Developing Human Male:

•The gonad (testis) fights over the mesonephric duct with the kidney, eventually taking it over.

•Testis take over the mesonephric duct for itself, and it winds up becoming the spermatic duct, or DUCTUS DEFERENS.



DESCENT OF THE TESTES:

•Recall from the previous lecture that the male testes descend from their initially intraperitoneal position, through the body wall, into a pouch protruding from the body wall called the SCROTUM.

•Everything gets drug along in this descent: ductus deferens, nerves, blood vessels.

•All of these together form a connection ("leash") of testicular connections called the SPERMATIC CORD.

SERIAL HOMOLOGS OF SCROTAL STRUCTURES

As testes push through body wall, they carry with them all layers and a bit of coelomic space. The equivalents are:

- •Skin: SCROTAL SAC
- •Superficial fascia: DARTOS MUSCLE
- •External oblique: EXTERNAL SPERMATIC FASCIA
- •Internal oblique: CREMASTER MUSCLE
- •Transversus abdominus: INTERNAL SPERMATIC FASCIA
- •Coelom + peritoneum: TUNICA VAGINALIS







RETROPERITONEAL POSITION OF THE TESTES

•The serial homolog of the coelom and its peritoneal boundaries together are called the TUNICA VAGINALIS.

•(Another way of saying this is that each testis is surrounded by its own little coelomic sac.

•Remember, each testis started out retroperitoneal on the dorsal side of the body wall with the coelom ventral to it.

•Appropriately, tunica vaginalis is wrapped around only part of each testis – the ventral side, leaving it retroperitoneal even in the scrotal sac. WHY DESCEND???

Preserve male fertility – sperm must be kept a bit cooler than standard mammalian body temperature. Otherwise they degenerate and lose motility.

Recall from the previous lecture:

•As a transitory stage of kidney degenerates, a ligament called the GUBERNACULUM descends on each side of abdomen from inferior pole of gonad.

•Gubernaculum passes obliquely through developing anterior abdominal wall at site of future inguinal canal and attaches at internal surface of labioscrotal swelling (future position of scrotum in males or labium majorum in females).

•Gubernaculum is thought to guide descent of testes into scrotum, and ultimately anchors testis to scrotal wall.

ENTRANCE INTO THE SCROTUM

•Spermatic cord passes through opening to the scrotal pouch to reach the testis on each side.

•If it were a wide open hole, loops of the intestine could slip out there – with resulting damage to gut tube (constriction or strangulation) – a "HERNIATION" or HERNIA.

•This danger is guarded against by the opening being a very narrow slit – the INGUINAL CANAL.

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The testes "descend" and place the spermatic cord in a position just ventral ("in front of") the ureter!!



Notice how the spermatic cord loops ventral to ("in front of") the attachment of the ureter of the bladder.



Sperm are stored at the distal end of the old mesonephric duct...at the distal end of the ductus deferens.

This distal end bit that attaches to the testis is called the **EPIDIDYMIS**.

"DESCENT" OF THE OVARY

•The ovary also descends, following a gubernaculum, but it does not exit into an extra-abdominal position like the testes.

•It ends its descent just below rim of bony pelvic girdle.

•The ovary's gubernaculum persists in the adult as a pair of fibrous cords that RUN THROUGH A VESTIGAL INGUINAL CANAL, and insert into the LABIA MAJORA.



(RETURN TO) DIVISION OF THE CLOACA

•Recall how the urogenital diaphragm subdivided the cloaca in a rectum and a bladder.

•Recall also how it subdivide the cloacal opening to split off the urogenital opening from the anus.

•The urogenital opening is the more ventral of the two.



UTERUS AND VAGINA

•Recall the formation of the uterus from the midline fusion of the paramesonephric ducts (fallopian tubes).

•The space left for the opening ventral to the rectum is the UROGENITAL SINUS.

•A midline outpocketing of the urogenital sinus grows dorsally toward uterus and forms a tubular VAGINA.

•The vagina opens at its dorsal end into the uterus and at its ventral end into the urethral part of the urogenital sinus.



In Females: THREE OPENINGS of the old cloaca: (1) urethra, (2) vagina, and (3) anus.









ERECTILE TISSUE

•Just above (cranial to) cloacal opening in human embryo is a small bump called the GENITAL TUBERCLE.

- •It forms from tissue of the cloacal rim.
- •It elongates and comes to hang over opening.
- •Specialized erectile tissue develops from mesoderm in the tubercle as well as rim of urogenital opening.

The specialized erectile tissues form as two masses on each side of the midline (total of four-4):
Closer to midline: right and left BULB.
More laterally: right and left CRUS (plural – curura).

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ERECTILE TISSUE IN THE MALE

Males have three columns of erectile tissue.

•Right and left bulbs fuse in the midline to form the CORPORA SPONGIOSUM – surrounds the urethra.

•Urethra emerges out of tip of enlarged genital tubercle – the GLANS OF THE PENIS.

•At its tip is the bulbous dilation that is the GLANS OF THE PENIS.

•Right and left crura remain independent and form the paired CORPORA CAVERNOSA.

•Right and left sides are bound to one another by TUNICA ALBUGINEA.









Fig. 1092 The penis, cross section, ventral view. The level of the section is shown in Fig. 1096. Note the incomplete separation of the two corpora cavernosa by the septum of the penis. Fig. 1093 The penis, cross section, ventral view. The level of the section is shown in Fig. 1096.



Fig. 1094 The penis, cross section, ventral view. The level of the section is shown in Fig. 1096. Fig. 1095 The glans penis, cross section, ventral view. The level of the section is shown in Fig. 1096.



ERECTILE TISSUE IN THE FEMALE

•Erectile tissue is present, but bulbs do not fuse in midline and do not enlarge as much.

•They form separate masses of erectile tissue on either side of the vginal opening - the BULBS OF THE VESTIBULE, which become the LABIA MINORA (singular, MINORUM)

•As a result, the female urethra cannot be enclosed in the midline (as in the corpora spongiosa of the male)

- •The tip end if the midline columns is the CLITORIS.
- •Similarly sensitive to glans of male.



GLANDS OF INNER WALL OF UROGENITAL SINUS

Several glands develop s outpocketings of the inner wall of the urogenital sinus. (Most are better developed in males.)

PROSTATE GLAND – at upper end of urethra in the male. Encircles urethral neck.

SEMINAL VESICLES – outpocketing of ejaculatory duct.

BULBOURETHRAL GLANDS – in postpelvic body wall (of uncertain function)

GREATER VESTIBULAR GLANDS – (in females) secrete mucous fluids that serve as lubricants during copulation.



MUSCULATURE OF PERINEAL REGION

In both sexes, the mass of erectile tissue is overlain by a thin mass of specialized hypaxial musculature.
This is often referred to as the specialized FOURTH layer of hypaxial musculature in the perineal region.

ICHIOCAVERNOSUS MUSCLE – arises from ischium behind crus of penis or clitoris. Wraps behind to insert on either side on tunica albuginea.

BULBOSPONGIOSUS MUSCLE – arises from central tendon (median raphe') of the urogenital diaphragm and inserts into the tunica albuginea (males) or fascia of clitoris (females).





MUSCULATURE OF PERINEAL REGION

ICHIOCAVERNOSUS MUSCLE BULBOSPONGIOSUS MUSCLE

•The function of these muscles is debated.

Some (mostly male researchers) insist that their position overlying erectile tissue aids in the erection of the male.
(Uh, OK, so then why to females have them?) IF that's the case,

then erection ought to be a voluntgary, controllable function for males.

•More likely: they have a sphincter-like function to:

- squeeze out last few drops of semen in males.
- have sphincter-like function around vaginal opening in females.



VASCULAR SUPLY TO BLADDER (AND PROSTATE): Superior Vesicle & Inferior Vesicle Arteries and Veins