Penis

The penis originates as two crura from the ischial arch. The crura converge to form the root of the penis , which continues as the body of the penis (corpus penis) to the glans of the penis **(glans penis).**

The penis is suspended between the thighs on the ventral surface of the trunk with its free extremity pointing towards the umbilicus in all domestic mammals except the cat, where it is directed caudally. The organ is constructed of three columns of erectile tissue, which are independent at the root of the penis, but combined throughout the rest of the penis.

The penis is composed of the following divisions and subdivisions:

١- Root of the penis (radix penis) with:

- Crura of the penis formed by two columns of cavernous tissue .
- Unpaired bulb of the penis formed by the spongy body of the penis.

٢- Body of the penis (corpus penis) with :

- Cavernous body
- Spongy body (corpus spongiosum urethrae)

٣- Glans of the penis (Glans penis) with:

- Spongy body
- Os penis, a modification of the cavernous body (dog).

The two dorsal columns of erectile tissue are known as the crura of the penis and consist of a core of cavernous tissue enclosed by thick connective tissue, the albugineous tunic.

There are two different types of penis in the domestic mammals, in regard to the structure of the cavernous body.

١- The fibroelastic type of penis of ruminants and pigs has small blood spaces divided by substantial amounts of tough fibroelastic tissue and is enclosed by a thick tunica albuginea surrounding both the cavernous body and the spongy body. In these animals, the non – erect penis exhibits a **sigmoid flexure** between the thighs.

٢- In the other, **musculocavernous type of penis,** the blood spaces are larger and the tunic and intervening septa more delicate and more muscular. The musculocavernous type is found in the stallion and in carnivores.

The glans of the penis shows species – specific modification . In the stallion , the glans resembles a mushroom with the corona (corona glandis) being the widest part. Towards the body of the penis and behind the corona the glans is constricted to form the neck of the glans. The free end of the corona is marked by a central fossa.

In the dog, the distal end of the cavernous body is modified to form the **penile bone**(os penis), which is grooved ventrally to accommodate the urethra within the spongy body.

The apex of the penis is very characteristic in small ruminants, in which the **urethral process** is continued (about ٤ cm in the sheep and ٢,٥ cm goat) beyond the substantial glans. The urethral process contains erectile tissue.

Prepuce

The prepuce or sheath, is a fold of skin that covers the free end of the penis in the retracted state. It consists of an external lamina and an internal lamina.

The external lamina is the skin of the outer surface, which continues as the inner sleeve at the preputial ring.

The internal lamina has copious amount of lymphoid tissue and modified sebaceous glands .

Muscles of the penis

The muscles of the penis comprise :

١- Paired ischocavernous muscle

٢- Bulbospongious muscle

٣- Paired retractor penis muscle

The **paired ischocavernous muscles** are powerful muscles, which aries from the ischial arch and enclose the crura to the level of their fusion at the root of the penis. The **bulbospongious muscle** is the extrapelvic continuation of the

striated urethralis muscle, which surrounds the pelvic part of the urethra . It extends distally on the surface of the spongy body at a variable distance depending on the type of the penis . In animals with a fibroelastic type of penis . It is limited to the proximal third of the penis; in the stallion it continues to the apex of the penis.

The **retractor of the penis** is also a paired muscle, which arises from the caudal vertebrae and descends through the perineum around the anus to reach the penis . In species with a sigmoid flexure (ruminants and pig) , it attache s to the caudal arch of this flexure ; in species with a musculocavernous penis , it follows the bulbospongious muscle to the apex of the penis. It is mainly composed of smooth muscle fibres.

Blood supply, Lymphatic drainage and innervation of the urethra and the penis

The urethra ,accessory genital glands and the penis are supplied by branches of the **internal pudendal artery.** One branch, the prostatic artery, supplies the genital organs that are located in the pelvic cavity. At the ischial arch the internal pudendal artery divides into the **artery of the bulb of the penis** supplying the spongy body , **the deep artery of the penis** supplying the cavernous body and the **dorsal artery of the penis,** which passes along the length of the penis to supply the glans penis.

The **internal pudendal artery** is augmented by branches of the **external pudendal artery** for vascularisation of the apex of the penis, which anastomoses with the dorsal artery of the penis to also vascularies the prepuce. In the stallion , additional anastomoses are formed between the dorsal artery of the penis and the obturator artery.

Lymph vessels from the genital organ located within the pelvic cavity drain into the **medial iliac lymph nodes** and into the **sacral lymph nodes.** The lymph vessels of the penis and prepuce drain into the **superficial inguinal (scrotal) lymph nodes.**

Innervation of the penis is provided by the paired pudendal nerve , which conveys multiple parasympathetic fibres . Numerous nerve ending are found in the glans penis and in the internal lamina of the prepuce.

Erection and Ejaculation

At the beginning of erection , blood flow to the penis increases as the wall of the supplying arteries relax . At the same time venous outflow becomes obstructed at the root of the penis , where the veins are compressed against the ischial arch. This has more effect on the cavernous body than on the spongy body ; the latter thus fills after the former . The process continues and intensifies after intromission, and the pressure

within the erectile tissue rises further. After ejaculation the cavernous body empties before the spongy body, and the pressure drops rapidly.

In species with a **fibroelastic penis ,** little additional blood is required in order to distend the cavernous spaces. Therefore , full erection may be achieved more rapidly. The penis does not increase greatly in size and its protrusion is largely due to the effacement of the sigmoid flexure. In the **musculocavernous type** of penis the cavernous spaces are much larger and more blood needs to be retained for full erection. Thus this process requires more time and there is a much greater increase in length and diameter.

Erection

Occurs prior to ejaculation. Semen is transported continuously toward the ampulla of the deferent duct by peristaltice movements of the epididymal duct and the deferent duct, which are caused by **smooth muscle cells** within their walls . Secretory activity of the lining of the epididymal duct is

regulated by androgens, and these have a positive effect on spermatic motility.