PENIS

I. INTRODUCTION

The penis is the male copulatory organ and constitutes the terminal organ micturition. It is located in front of the pubic symphysis and contains the male urethra ending into the external urethral meatus. The penis consists of three major parts, the root of penis, the body of penis and the glans of penis.

II. DESCRIPTIVE ANATOMY

The penis is made of two functionally distinct parts. (Figure 1)

The root of penis is hidden and fixed and is made of a central bulb and crus of penis on each side. The body of penis is visible and mobile and is made of two corpora cavernosa bound together side by side with the corpus spongiosum behind them. The body of penis contains the spongy urethra surrounded by the corpus spongiosum and its end is the glans of penis.

A- ROOT OF PENIS

The root of penis is located in the superficial perineal pouch attached to the inferior surface of the perineal membrane above the scrotum.

The crus of penis is attached to the angle between the perineal membrane and the everted margin of the pubic ramus in front of the ischiatic tuberosity. It receives the deep artery of the penis near its anterior end, continues forwards to become the corpus cavernosum. The crus of penis is provided with overlying muscle, the ischiocavernosus muscle.

The bulb of penis is the posterior end of the corpus spongiosum and is attached to the inferior surface of the perineal membrane. It is central, pear-shaped and provided with overlying muscle, the bulbospongiosus muscle. The urethra, accompanied by the arteries of the bulb, enters at the front of the bulb so that most of the bulge of the bulb is behind and below the urethra and the duct of the bulbo-urethral glands enters laterally. The bulb has a slight palpable midline notch on its under surface and extends back towards the perineal body.

B- BODY OF PENIS

At the front of the root area, below the subpubic angle, the two corpora cavernosa are bound together side by side with the corpus spongiosum behind them when the penis is dependent

but ventral to them and in front of the pubic symphysis when erect to form the body of the penis. The body of penis is columnar and flattened sagittally with an anterior face, the dorsum of the penis, a posterior face, the urethral face, and an expanded opposite end, the glans penis.
In the flaccid state, the body is vertical applied against the anterior face of the scrotum and is ten to twelve centimetres long with a diameter of two centimetres.
During erection, the body is horizontal lined with the root and is sixteen to eighteen centimetres long with a diameter of three centimetres.

C- GLANS OF PENIS

The glans of penis is the expanded opposite end of the body. The dorsal protrusion of its base is the corona of glans. The insertion of the prepuce is separated from the corona of the glans by a circular sulcus, the neck of glans penis. Its apex is pierced by a vertical seven millimetres high slit, the external urethral meatus. Its urethral face is separated by a median sulcus linking the external urethral meatus and the neck of glans penis.

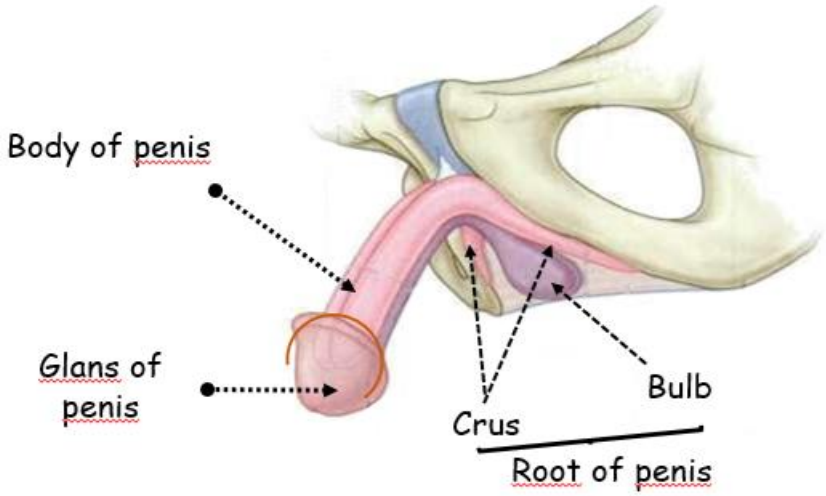

Figure 1: Overview of the root and body of penis

III. SUPPORTS

A- TUNICA ALBUGINEA

The tunica albuginea of the penis is not to be confused with the tunica albuginea of the testis, it consists of a tough fibrous membrane surrounding the corpus spongiosum and the two

corpora cavernosa, that of the corpus spongiosum enlarges distally to enclose the glans and the one of the corpora cavernosa defines two longitudinal grooves, dorsal, for the deep dorsal vein of penis and urethral for the corpus spongiosum.

The fibrous sheaths of the corpora are fused together and form a septum with vertical comb-like strands, the septum of penis.

B- FASCIA OF THE PENIS

The fascia of the penis also known as Buck's fascia is the cylindrical prolongation of Colles' fascia, the fascia transversalis of the perineum. It loosely surrounds the three corpora thus fused together. Beneath lie in the midline the deep dorsal vein with a dorsal artery on each side and more laterally a dorsal nerve.

C- SKIN

The skin of the penis is hairless and is prolonged forwards in a fold, the prepuce. It invests the corona of the glans and some or all of the rest of the glans. The insertion of the prepuce is separated from the corona of the glans by a circular sulcus, the neck of glans penis. The frenulum of prepuce is fixed in the median sulcus linking the external urethral meatus and the neck of glans penis. Beneath the skin in the midline is the superficial dorsal vein which is accompanied by lymphatics from the skin. The urethral face is marked by a median longitudinal wrinkle the raphe of penis continuous with the raphe of scrotum.

D- SUSPENSORY LIGAMENT OF THE PENIS

The suspensory ligament of the penis is a triangular sheet of fibrous tissue that attaches the fused sheaths of the corpora cavernosa to the under surface of the pubic symphysis.

E- FUNDIFORM LIGAMENT OF THE PENIS

The fundiform ligament of the penis attaches the fused sheaths of the corpora cavernosa outside the suspensory ligament to linea alba passing by mons pubis, superficial fibres are attached to the raphe of scrotum.

IV. STRUCTURE

A- CORPUS CAVERNOSUM AND CORPUS SPONGIOSUM

The corpus spongiosum and the corpora cavernosa are erectile tissues characterised by the presence of vascular cavities separated by muscular strands, the cavernous muscles. They are supplied by the helicine arteries of penis coming from the arteries of penis and drained by cavernous veins. The vascular cavities are very abundant in the corpus cavernosum and wider in the corpus spongiosum.

B- TUNICA ALBUGINEA

The tunica albuginea of the corpora cavernosa is thick and rich in collagen fibres. The two corpora cavernosa communicate through intercavernous anastomosis passing by holes in the middle part of the intercavernous septum.

The tunica albuginea of the corpus spongiosum is thin and rich in elastic fibres.

C- GLANS OF PENIS

The glans of penis is covered by a non-keratinizing squamous epithelium continuous with the one of the internal surface of the prepuce. The preputial glands are modified sebaceous glands in the corona and neck of glans penis, they secrete smegma.

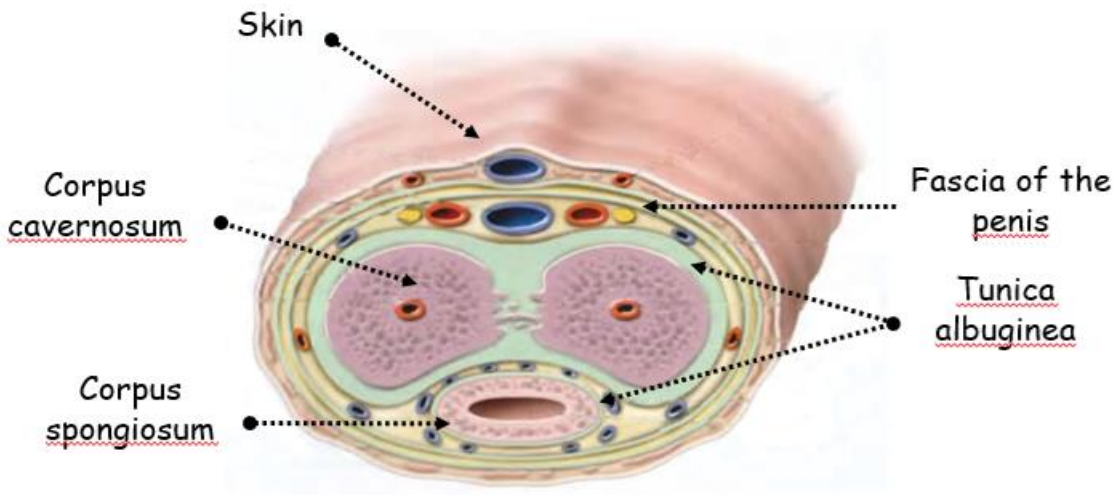

Figure 2: Horizontal section of the body of penis (From KAMINA)

V. BLOOD SUPPLY; LYMPH DRAINAGE AND NERVE SUPPLY

A- ARTERIES

The penis is supplied by three pairs of deep arteries all branches of the internal pudendal artery.

The internal pudendal artery is a branch of the internal iliac artery, it enters the deep perineal pouch from the anterior end of the pudendal canal and passes forwards along the ischiopubic ramus above the perineal membrane, with the dorsal nerve of penis above it and the perineal nerve below it and finally crosses the perineal membrane, it, finally, ends giving the deep artery of penis and the dorsal artery of penis.

The deep artery of penis supplies the corpus cavernosum.

The dorsal artery of penis runs alongside the deep dorsal vein and forms an arterial circle around the neck of glans penis. Branches from the circle supply the skin, fascia and glans.

The artery of bulb of penis supplies the corpus spongiosum including the glans.

The anastomosis via the continuity of corpus spongiosum and glans between the artery of the bulb and the dorsal artery leaves the deep artery separate, supplying the corpus cavernosum only and forming a closed system whose sole function is erection.

Superficial arteries are provided by the external pudendal artery, they supply the skin of penis.

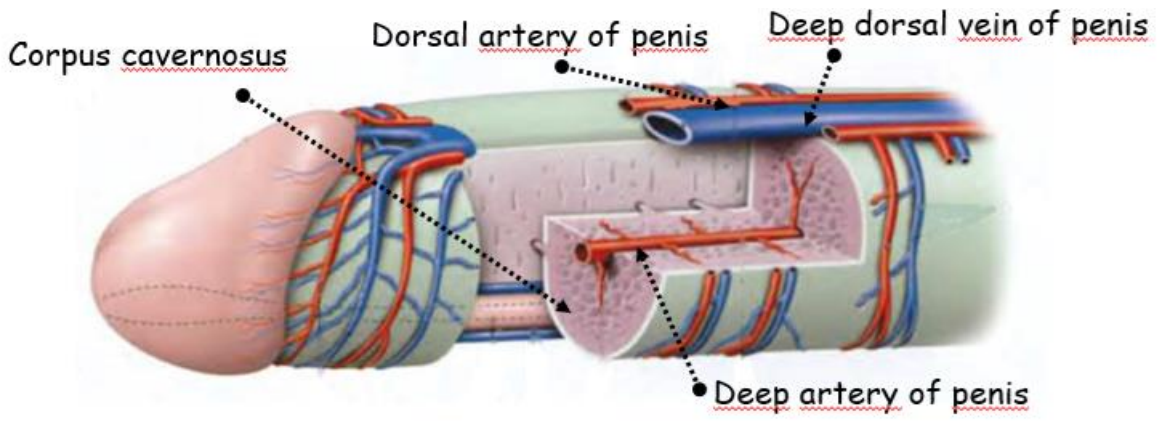

Figure 3: Lateral view showing the blood supply of penis (From KAMINA)

B- VEINS

The veinous drainage of the penis is partly ensured by way of bulbous veins that accompany the arteries and join the internal pudendal veins and mostly by the deep dorsal vein of penis.

The deep dorsal vein of penis runs above the fascia of penis, pierces the suspensory ligament under the subpubic orifice, passes above the perineal membrane and enters the vesicoprostatic veinous plexus and the internal pudendal veins. It drains mainly the glans and the corpora cavernosa.

The superficial dorsal vein of penis drains the dorsal skin of the penis and divides to join the superficial external pudendal and great saphenous.

C- LYMPH DRAINAGE

The lymphatics of the skin of penis drain into the superficial inguinal nodes.

The lymphatics of the corpora and the glans drain into the deep inguinal nodes.

The internal iliac nodes are rarely involved unless the inguinal nodes are first affected.

D- NERVES

The skin of the penis is supplied by the pudendal nerves via the posterior scrotal and dorsal nerves; the latter supply the glans. The dermatome mainly involved is S2. The bulbocavernosus and ischiocavernosus muscles which contract spasmodically during ejaculation are supplied by the perineal nerve from the pudendal, S2 and 3. The sympathetic nerves necessary for the initial stages of ejaculation are derived from L1 segment of the spinal cord via the superior and inferior hypogastric plexuses. The pelvic splanchnic nerves S2 and 3 provide the parasympathetic supply to the cavernous tissue of all three corpora and allow increased blood flow for erection.

VI. SURGICAL APPROACH

Ritual circumcision for religious or racial reasons is probably the oldest operation in the world. In children or adults' circumcision may be required for a tightly constricting prepuce, phimosis. The prepuce is incised on the dorsum from the tip towards the base of the glans, dissecting away any adhesions, and then the incision is carried circumferentially, followed by suture of the skin edges.

VII. CONCLUSION

The penis is the copulation and micturition organ. Its anatomy is more complex than it appears with three different parts, root, body and glans much easier to learn when distinguished. It is a highly supported organ with two blood supply levels, deep and superficial. Its lymphatics drain to inguinal nodes and has a sophisticated somatic and autonomic nerve supply.