DIAGNOSIS AND MANAGEMENT OF VARICOCELE

Essay

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Master Degree

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By

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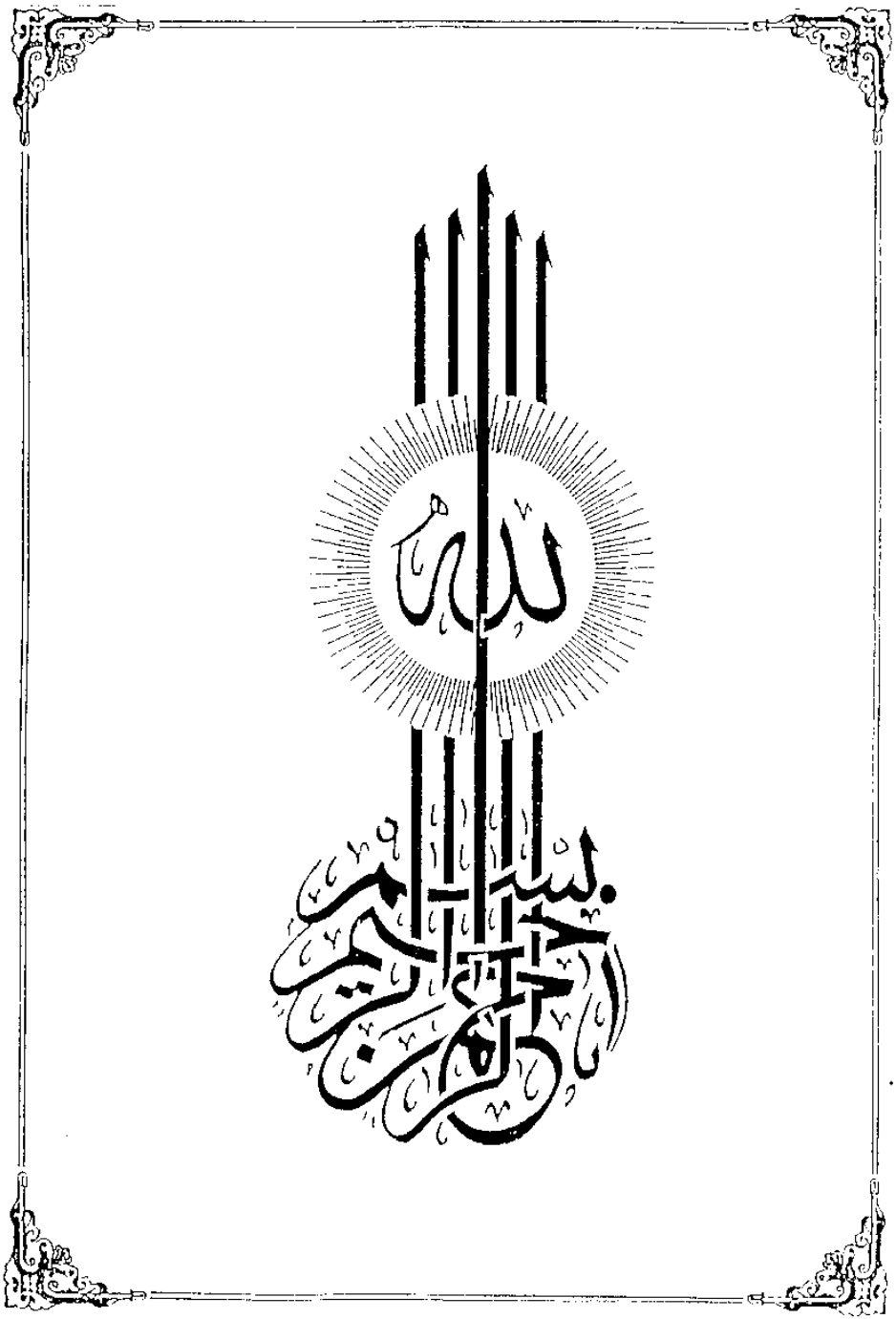

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INTRODUCTION AND AIM OF WORK

- Varicocele is not uncommon in surgical practice. it may give symptoms or may be symptomless. In some cases, it is associated with male infertility.

- Several hypothesis have been suggested to explain how varicocele is a significant aetiological factor in some cases of male infertility.

- Diagnosis of varicocele depends on clinical picture, scrotal thermography, retrograde venography and doppler.

- Management of varicocele differ according to its aetiology and complications.

- The aim of this work is to evaluate the best and most recent methods of diagnosis and the best methods of management of varicocele.

ANATOMY

i- Embryology

During the fifth and sixth weeks of intra-uterine life, a thickened area of epithelium appear on the medial side of mesonephric or urogenital ridge. It becomes suspended by mesentry called mesogenitale and supplied by a branch of aorta and called genital ridge. Lateral to genital ridge is the mesonephros or paramesonephric duct.

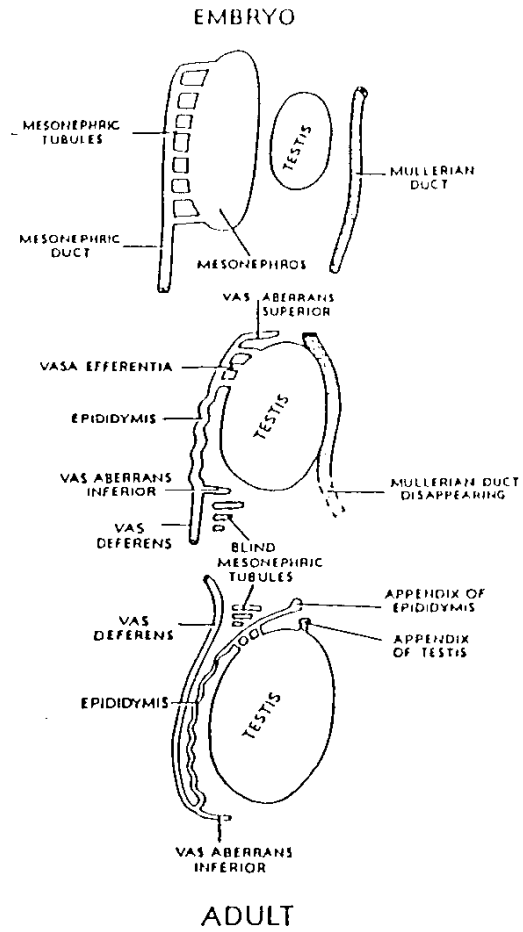
In the seventh week, the gland increases in size with the appearance of testis cords which contains all sex cells. The tunica albuginea, which is a thickened mesenchyme appears and extends to cut off the testis cords from the surface. The testis development is constituted by the primordial sex cells, caelomic epithelium (seminiferous tubules) and mesenchyme (Connective tissue).

The cords increase in length by the addition from coelomic epithelium and converge towards the hilum of the testis to form the rete testis.

The testis cords develop into seminiferous tubules which remain solid untill puberty.

The mesonephric "wolffian" duct connect to rete testis by the upper 6 to 12 of the remaining excretory mesonephric tubules which form the head of epididymis. The mesonephric duct itself forms a canal of epididymis, ductus deferens and ejaculatory duct.

The mesonephric tubules above the testis form appendix of epididymis while below the testis they form paradidymis and inferior aberrant tubules. The paramesonephric "Mullarian" duct degenerates completely except a small part at its upper end which form the appendix testis **(Fig. 1)**.



EARLIEST STAGE The mesonephros drains urine into meso nephric duct . The gonad develops between the mesonephros and the Mullerian duct

LATER STAGE The mesonephros vanishes but its duct persists. Some mesonephric tubules remain, to carry spermatozoa from testis to mesonephric duct (epididymis ; they are the vasa efferentia. Other tubules persist, blind at one or both ends. The Mullerian duct is vanishing

AFTER DESCENT The adult relationships result from descent. The vas, formerly running downwards, now runs upwards from the epididymis ; this carries the blind mesonephric tubules (paradidymis) from lower to upper pole

Fig1.

The Development Of The Vasa Efferentia And The Epididymis

Desent Of The Testis :-

The testis at first lies on the posterior abdominal wall at the level of the upper lumbar vertebrae, its lower pole is attached to a ridge of tissue called gubernaculum testis which extends down to the inguinal region and, passing through the abdominal wall, is attached to the skin. Both testis and gubernaculum lie behind the primitive peritoneum, as the foetus grows and the gubernaculum becomes relatively shorter, it carries the peritoneum on its anterior surface down through the anterior abdominal wall as a blind tube, the processus vaginalis, which thus traverses the inguinal region and

reaches the genital swelling (rudimentary scrotum). As the processus vaginalis descends, the testis is guided by the gubernaculum down the posterior abdominal wall and the back of the processus vaginalis into the scrotum. **(Fig. 2)**.

The descent of the testis has been explained in terms of mechanical factors such as:

i- Increase intra-abdominal pressure.

ii- Differential growth between the gubernaculum and the body wall.

However, hormonal factors, particularly secretions from the anterior lobe of pituitary, play an important role.

The final descent of the testis through the inguinal canal to the scrotum is controlled by testosterone and maternal gonadotrophins.

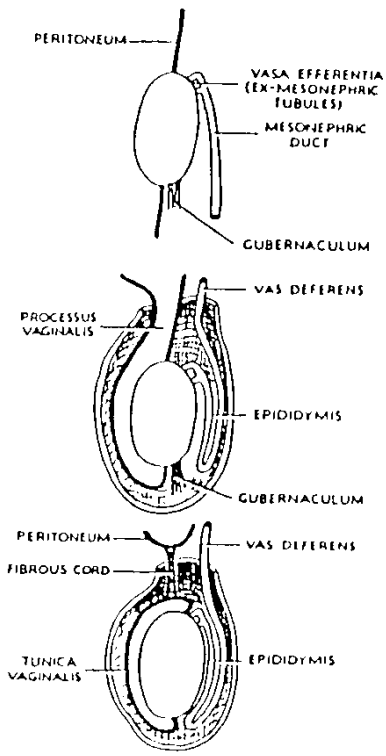


Fig 2.A The Stages of Testicular Descent

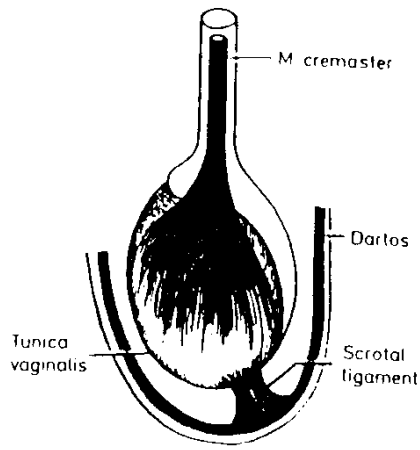


Fig 2.B Scrotal Ligament

The testis descends from lion to iliac fossa in the third month of intra-uterine life, it rests at the site of the internal inguinal ring from the fourth to seventh month, travelling through the inguinal canal during the seventh month, lies at the external inguinal ring in the eighth month and in the ninth month, it enters the scrotum, reaching its base at or after birth.

The processus vaginalis follow the path of gubernaculum and invades the anterior abdominal wall, it carries with it a covering from each of the layers of the abdominal wall and in this way the inguinal canal is formed, with: i- The fascia transversalis forming the internal spermatic fascia.

ii- The internal oblique and transversalis muscles forming the cremastric fascia.

iii- The external oblique forming the external spermatic fascia.

Fate Of The Processus Vaginalis :-

Soon after birth, the processus vaginalis becomes occluded at two points: **first**, at the internal inguinal ring and **second**, just above the testis. The part of the sac between the two occlusions is the funicular process, which becomes obliterated forming a fibrous cord, the rudiment of the processus vaginalis.

The scrotal part of the processus vaginalis persists invaginated by the testis to form the tunica vaginalis. **(Fig. 2A)** .

Fate Of Gubernaculum Testis :-

A fibrous condensation, the scrotal ligament, attaches the parietal layer of the tunica vaginalis and the lower pole of the testis to the bottom of the scrotal sac. It is the vestigue of the gubernaculum testis. **(Fig 2B)**

ii- Anatomy of The Scrotum

The scrotum is a cutaneous and fibromuscular sac containing the testes and the lower parts of the spermatic cords, and dependent below the pubic symphysis and the root of penis, in front of the upper parts of the thighs.

It is marked in the median plane by a ridge called the raphe of the scrotum which is continued backwards along the midline towards the anus and forwards on the urethral surface of the penis. The raphe indicates the bilateral origin of the scrotum from the genital swellings. The left side of the scrotum reaches to a lower level than the right, in correspondence with the lower level of the left testis due to greater length of the left spermatic cord.

The external appearance of the scrotum varies in different circumstances: Thus, under the influence of warmth, and in old and debilitated persons, the scrotum is smooth, elongated and flaccid, but, under the influnece of cold and in the young, it is short, corrugated and applied to the testis. This difference in the appearance of the scrotum at different circumstances is due to the degree of contraction or relaxation of a layer of plain muscle fibres, the **dartos**, situated in the superficial fascia.

The scrotal skin, is very thin, of a dark brownish colour, and often thrown into folds or rugae. It is covered with sparse hairs, the roots of which are visible through the skin, it is provided with sebaceous glands. It also contains numerous sweat glands, pigment cells, and nerve endings. Subcutaneous adipose tissue is lacking.

The dartos muscle, is a thin layer of non-striated muscle fibres placed in bundles and intermingled with fibro-elastic tissue. The muscle bundles are arranged separately and not in a fusciculi. There are three types of muscle bundles: Circular, oblique and longitudinal. These bundles are arranged in a crisscross pattern, with wide spaces between their decussations occupied by blood vessels. The circular muscle bundles are the outermost stratum, while the longitudinal bundles form the innermost stratum.

The muscle fibres are continuous, around the base of the scrotum, with the superficial fascia of the groin and penis superiorly. This superfical location of the dartos in the skin of the scrotum enables it to react to minimal temperature variations.

At the sides, the muscle is attached to the pubic arch, while posteriorly, it is continuous with the superficial fascia forming the floor of the superficial perineal pouch. It sends inwards a sagittal septum of the scrotum, which connects the raphe to the inferior surface of the radix of the penis and divides the scrotum into two cavities for testes.

The scrotal septum is composed of all the layers of the scrotal wall (i.e. tunica vaginalis, internal spermatic fascia, cremasteric muscle and fascia and external spermatic fascia) except the skin, which forms one continuous investment to the entire scrotum. The dartos muscle, is closely united to the skin, but is connected with the subjacent parts by delicate areolar tissue, by means of which it is able to move with great independence. On exposure to cold, the muscle contracts, the intervening blood vessels are constricted resulting in diminution of the scrotal blood flow, a mechanism which minimizes the heat loss to preserve the intrascrotal temperature.

On exposure to heat, the muscle relaxes leading to dilatation of the intervening blood vessels and lowering the testicle away from the abdomen, a mechanism which facilitates heat loss to maintain the intrascrotal temperature constant.

Vascular Supply Of The Scrotum :-

I- Arteries

1- Anterior scrotal branches

Which supply the upper and anterior part of the scrotum, and they are :-

a- External pudendal branches:

i- Superficial external pudendal artery: arises from the femoral artery, passes medially in front of femoral vein and anterior to the spermatic cord to supply the scrotum in males.

ii- Deep external pudendal artery; arises from the femoral artery, about one and half inches below the inguinal ligament, passes medially, behind or infront of the femoral vein, behind the spermatic cord and infront of pectineus and adductor longus muscles. It pierces the deep fascia to supply the scrotum.

b- The cremastric branch from the inferior epigastric artery:

It is called the external spermatic artery, arises very close to the deep inguinal ring and enters it to supply the cremastric muscle and also supply the scrotum.

2- Posterior scrotal branches

They arise, from the internal pudendal branch of the anterior division of the internal iliac artery, in the anterior part of the pudendal canal. They are two in number and accompany the scrotal nerves. They supply the posterior part of the scrotum.

II- Veins

The veins follow the course of the corresponding arteries.

III- Lymph Vessels

End in the superficial inguinal lymph nodes.

Nerve supply

1- Anterior third

Supplied mainly from the first lumbar segment of the spinal cord through:

a- Ilio-inguinal nerve (L1) : It is a branch of the lumbar plexus. It appears at the lateral border of the psoas major. After a short course, behind the kidney, in front of the quadratus lumborum muscle. It pierces the transversus abdominis muscle and run between it and internal oblique muscle , in a direction forwards, downwards and medially. Then, it pierces the internal oblique muscle and run between it and external oblique muscle. It passes out through the superficial inguinal ring and divides into branches which supply the skin of the scrotum and the skin of the upper part of the medial side of the thigh. In its course, it is slightly at a lower level than llio-hypogastric nerve.

b- Genital branch of the genito-femoral nerve (L1,2) : The genito-femoral nerve descends through the substance of the psoas major and then on the anterior surface of the muscle, behind the peritoneum of the posterior abdominal wall, at the level of the third or fourth lumbar vertebrae.The genital branch arises from the genito-femoral nerve above the inguinal ligament and passes into the deep inguinal ring to supply the cremaster muscle and gives twigs to the skin of the Scrotum in male.

2- Posterior two thirds

Are supplied mainly from the third sacral segment through:

a- The two posterior scrotal branches of perineal nerve (S 2,3,4).

The perineal nerve arises from the pudendal nerve, which is one of the two terminal branches of the sacral plexus, in the posterior part of the pudendal canal and runs with the internal pudendal vessels. Near the anterior end of the canal, it gives off two scrotal nerves, a medial and a lateral one, pierce the medial wall of the canal and pass through the anterior part of the ischiorectal fossa. Then, they pass into the superficial perineal pouch. They supply the posterior two-thirds of the scrotum.

b- Perineal branch of the posterior femoral cutaneous nerve of the thigh. (S 1,2,3,) :

It is a branch of the sacral plexus, it leaves the pelvis through the greater sciatic foramen below the piriformis. Then, it passes inferiorly under cover of the gluteus maximus and lying over the sciatic nerve. The perineal branch curves around the origin of the hamstring muscles from the ischeal tuberosity to reach the perineum and supplies the skin of the scrotum in males.