DISORDERS OF TESTICULAR FUNCTIONS

ESSAY

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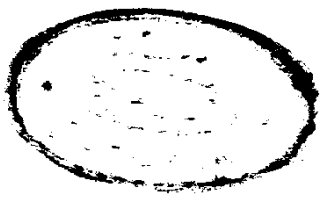
(Urology)



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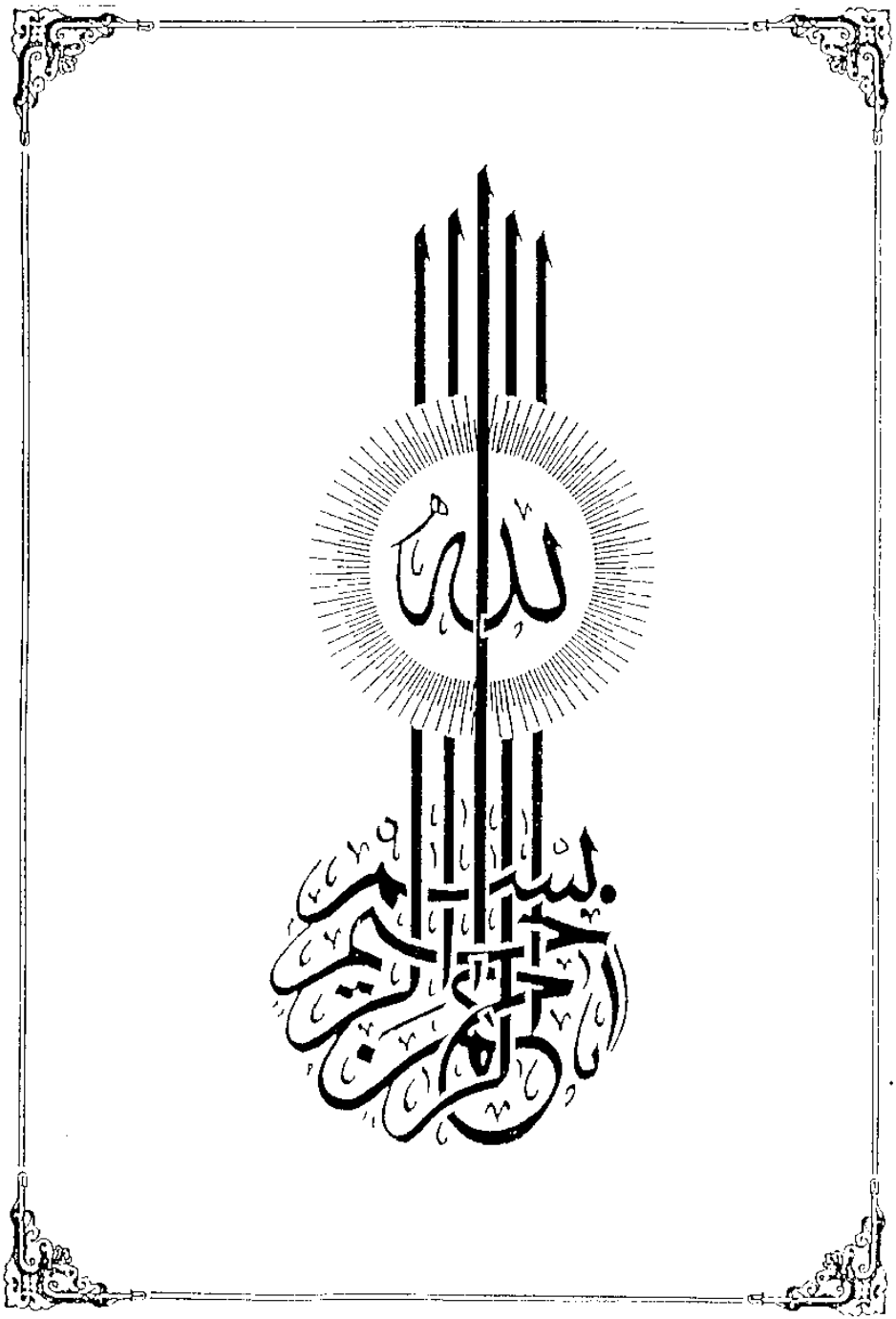

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INTRODUCTION

Reproduction is the most important function of all living organisms as it aims to maintain life and keep species.

The testes, a small organs, carry the secret of reproduction.

This work is aiming at illustrating the basic information necessary to understand the physiology,control, evaluation of testicular functions and the disorders that may affect the testicalar functions as a procedure for diagnosis and managment. The two major functions of the testis are :

- Spermatogenesis
- Androgen production

These two functions are under the control of the pituitary gland, through its gonadotropins, which in turn is under the control of the hypothalamus through its GnRH.

So evaluation of testicular function should include all the elements of the Hypothalamic - Pituitary - gonadal axis. Disorders of testicular functions are numerous, and to facilitate approach to their diagnosis, an attempt is made to group them in four main groups : those with low gonadotropin levels, those associated with elevated gonadotropin levels, those with normal gonadotropin levels and finally, those which cannot fall in the above groups, other causes of testicular disorders.

CHAPTER: I

EMBRYOLOGY OF THE TESTIS

I : Introduction

The sex of an embryo is determined since fertilization, but characteristic gonadal differentiation into males and females does not appear until the seventh week of foetal life. In both sexes, the early genital system is similar and as a begin all human embryos are potentially bisexual.

The genital glands, testes and ovaries, are formed from two types of cells; the reproductive germinal cells or pre-mordial germ cells and the nutrient supportive cells (Pansky 1982).

A : The Reproductive Germ Cells

They are the precursors of the definitive germ cells. They are large, spherical cells with granular cytoplasm rich in lipids, can be identified in the human embryo at the fourth week in the endoderm in the adjacent part of the yolk sac. At this stage their number is from twenty to thirty. They migrate dorsally by amoeboid movement and by growth displacement along the dorsal mesentry of the hindgut to reach the medial side of the mesonephric ridge (William and Warwick 1980).

B : The Nutrient Supporting Cells

They are produced from the genital ridge which is formed as a thickening of the coelomic epithelium lining the anterior of the internal ridge of the mesonephric body.

II : The Undifferentiated Gonads (Figure 1 - 1 A)

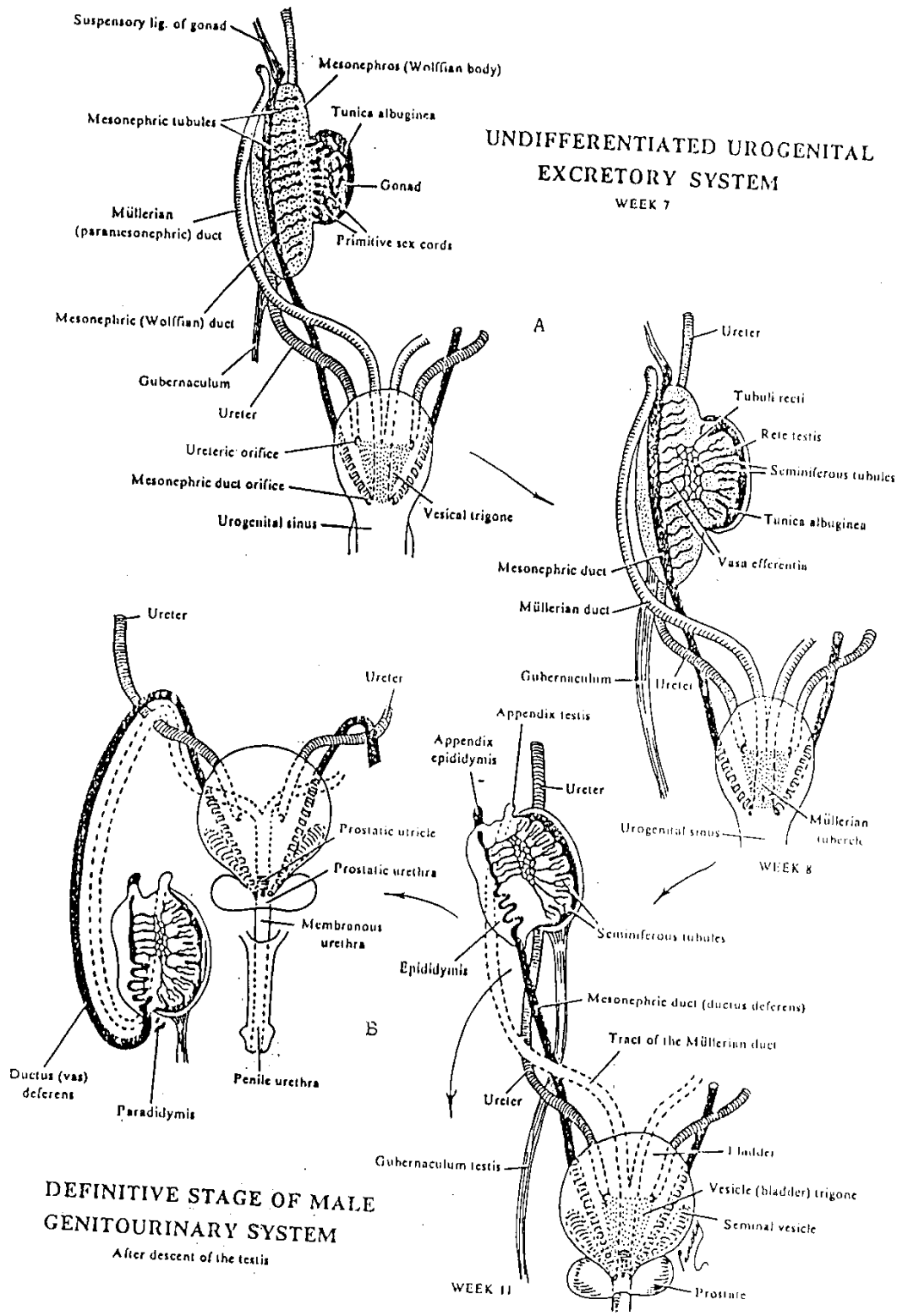
The coelomic epithelium of the genital ridge proliferates and grows into the underlying mesenchyme forming the primary sex cords. During the six week of foetal life, the premordial germ cells invade the genital ridge to become incorporated into the primary sex cords.

At this stage the gonads of both male and female embryos are morphologically identical. The gonads now consist of an outer cortex and inner medulla.

In embryo with XX, sex chromosome complex, the cortex forms an ovary and the medulla regress. In X Y, sex chromosome complex, the medulla forms the testis and the cortex regress. The Y chromosome has a testis - determining effect on the medulla of undifferentiated gonads.

III : Development of The Testis (Figure 1 - 1 B)

The primary sex cords proliferate and anastmose deep in the mesenchyme producing a network, the rete, which pulges under the coelomic epithelium. The rete anastmoses with the adjacent mesonephric tubules. By the end of the second month, the mesonephric body begin to regress and only the mesonephric tubules remain linked to the genital ridge. The prominent sex cords become the seminiferous tubules. A layer of connective tissue, developing from the mesenchyme, grows cuttin the coelomic epithelium from the gland. This is the tunica albuginea, from its deep surface, fibrous septae



(Figure 1 - 1)

Stages in development of the definitive male genitourinary system.

extend dividing the gland into compartments. It is a characteristic feature of testicular development.

The seminiferous tubules become seperated by mesenchyme which give rise to the interstitial cells of leydig. These become fully developed between 14 and 16 week. They secrete androgenic hormones which help in development of the external genital organs and the genital tract (Pansky 1982).

The number of leydig cells declines after the eighteenth week and only few cells are present in the interstitium of the testis at birth. Foetal pituitary gland gonadotropins are essential for the continued growth and function of the foetal testis after the critical period of sex differentiation (Grumbach and Conte 1981).

The walls of the seminiferous tubules are derived from :

a) The premordial germ cells giving rise to the spermatogonia.

b) The germinal epithelium giving rise to the supporting or sustentacular cells of Sertoli which is predominent in the foetal testis (Pansky 1982).

Grumbach and Conte 1981, stated that the origin of Sertoli cells is not established in the human being and it may be derived from the gonadol mesenchyme, coelomic epithelium or from the mesonephric tubules and none can be excluded. Sertoli cells secrete mullerian duct inhibitory factor which

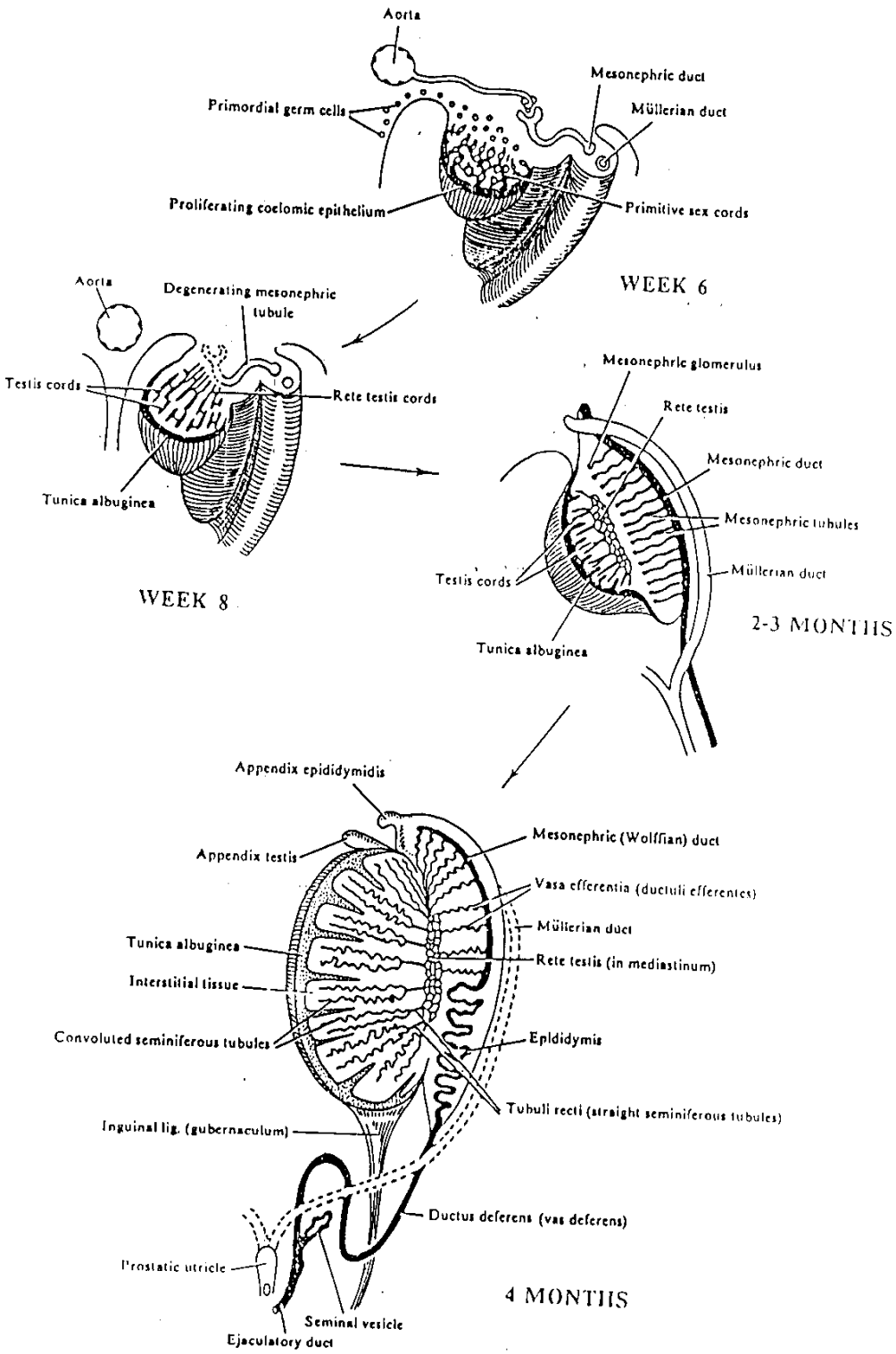
lead to dissolution of the mullerian duct.

The rete testis becomes continuous with about fifteen to twenty adjacent mesonephric tubules which share in the formation of the efferent ductules, these open in the adjacent mesonephric duct which becomes the epididymis, which is highly convoluted. Below the testis, the mesonephric duct gains a thick coat of smooth muscle to be the ductus defrens (Figure 1 - 2)

IV : Migration of The Testis

The gubernaculum, a ligament, is formed on each side of the lower poles of the gonads, passes obliquely through the developing anterior abdominal wall, to be attached to the labio-scrotal swelling. Ventral to the gubernaculum, on each side, a peritoneal sac; the processus vaginalis, developes and follows the gubernaculum through the anterior abdominal wall to the scrotum. (Pansky 1982)

The descent of the testis is not a simple migration. The caudal pole of the testis is retained at the deep inguinal ring by the gubernaculum until the seventh month, when it suddenly and rapidly passes through the inguinal canal and gains the scrotum. The exact mechanism of the descent is still uncertain. It has been attributed to increased intra - abdominal pressure, to a simple growth process or to shortening and active contraction of the gubernaculum, but none of these is convencing. The gubernaculum, being soft, may



(Figure 1 - 2)

offer a way of low resistance to the descending testis, accompanied by increased rate of growth of testis and epididymis may be a factor in testicular descent as far as the inguinal canal. (William and Warwick, 1980)

Descent of the testis, through the inguinal canal, into the scrotum is probably under hormonal effect (gonadotropins and androgens).

The processus vaginalis, first opened, narrows and then closes proximally, distally, in the scrotum it forms adouble serous membrane which the testis invaginates i.e. the tunica vaginalis. (Figure 1 - 3)

Over 97% of full term new-born boys have bilateral descended testes. However descent may occur during the first three months after birth. (Pansky 1982)

Chronolog of The Testicular Descent

1 - From loin to iliac fossa in the third month of intrauterine life.

2 - From the fourth to the seventh month it rests at the site of internal inguinal ring.

3 - During the seventh month it is travelling through the inguinal canal.

4 - In the eighth month it lies at the external inguinal ring.

5 - In the ninth month it enters the scrotum, reaching its base at or after birth.