ETIOLOGY OF CRYPTORCHIDISM

ESSAY

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Master Degree of General Surgery

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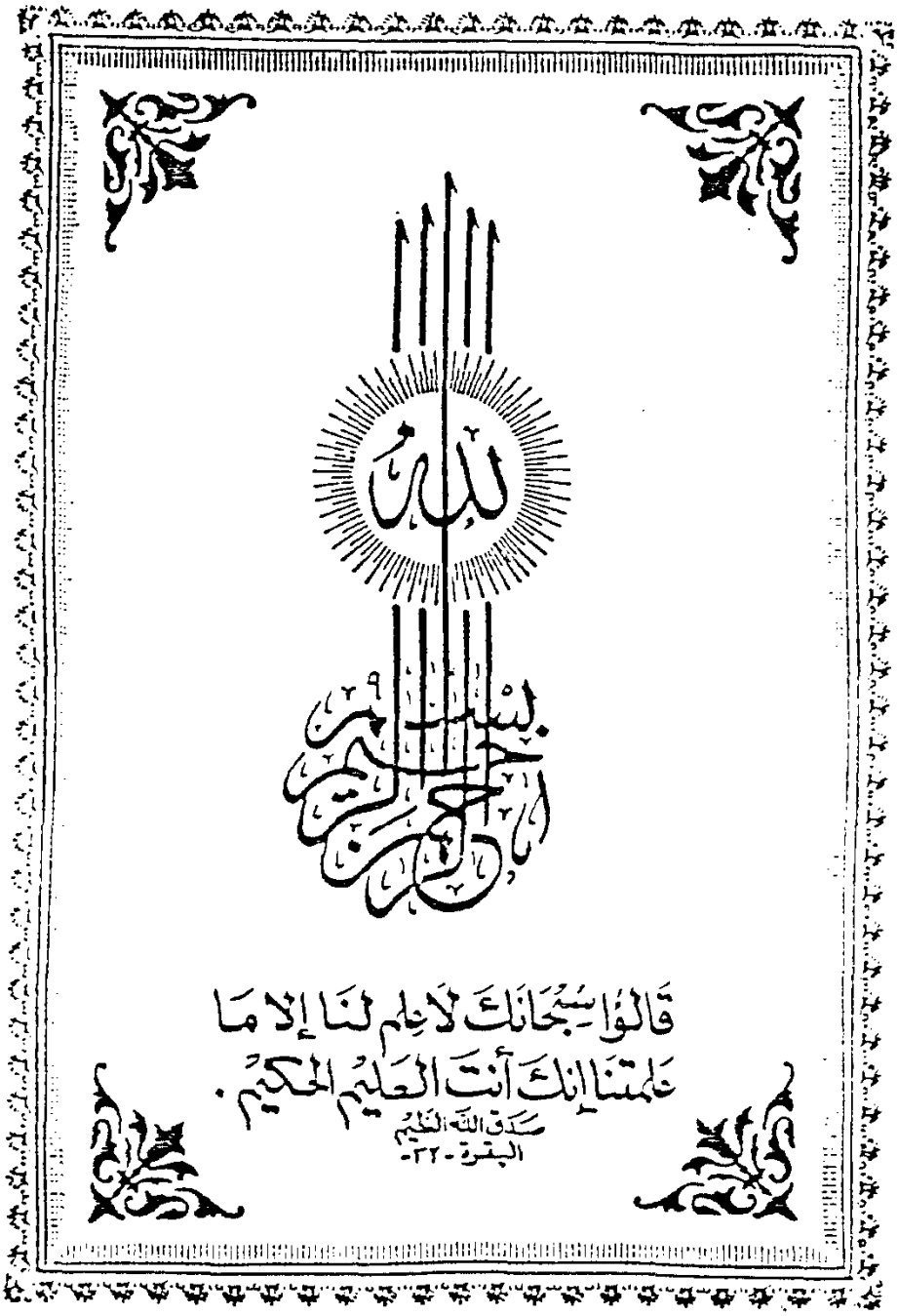

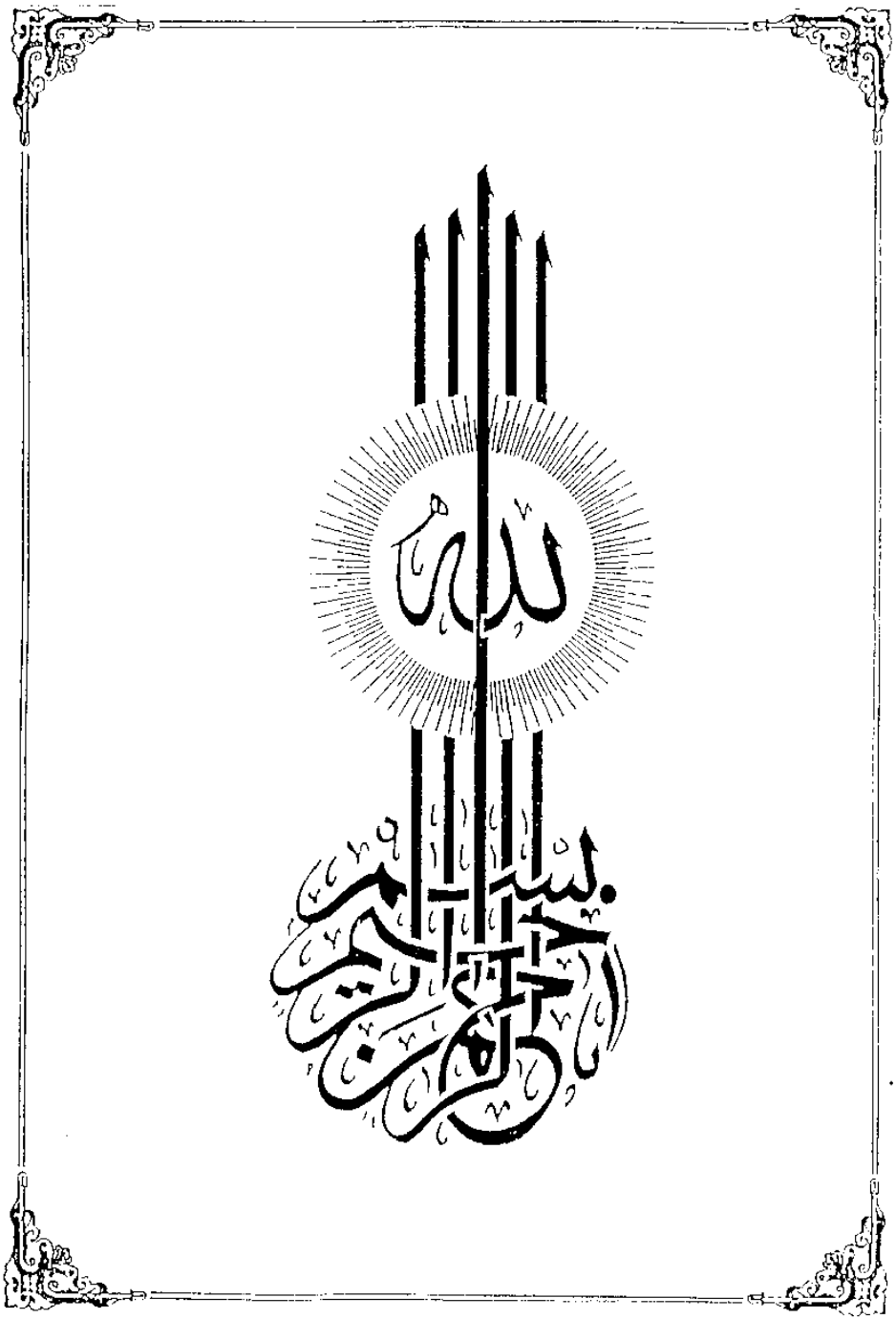

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INTRODUCTION

INTRODUCTION

Although testicular position can most easily be defined as normal or abnormal, one of the problems concerning this subject is its terminology.

Terms such as "imperfectly descended," "undescended," and "maldescended," have been commonly used, sometimes to describe the same condition.

The term cryptorchidism has come into wider use in recent years and although literally meaning "hidden testis" (Greek: cryptos: orchis), it is reasonable to accept it as describing any abnormally positioned testis (*Gough*, 1989).

Cryptorchidism refers to failure of, or incomplete, transit of the testis from its embryonic retroperitoneal position into the scrotum. It is the most common disorder of sexual differentiation that occurs in man.

It is estimated to occur in 21 percent of premature newborns and in 2.7 percent of full term newborns, and decreases to 0.8 percent by age of one year. Despite the frequent occurrence of this disorder little is known about its etiology and, consequently, a satisfactory classification based on pathogenesis can not be formulated (*Scorer*, 1964).

One reason for this lack of information is that more effort has been expended in studying the effects of cryptorchidism on the testis than in gaining a better understanding of the mechanisms involved in the movement of the testis from its site of origin in the genital ridge to its final location in the scrotum.

A variety of theories have been proposed to explain the mechanisms whereby the mammalian testis migrates.

Among the factors that claimed to be responsible for cryptorchidism are hormonal, neurological and gubernacular defects, abnormalities of the epididymis and intra-abdominal pressure, in addition, genetic, maternal and fetal factors.

So, multiple factors may produce maldescent and it is clear that cryptorchidism is a heterogenous entity and may be associated with a variety of other defects, such as genetic syndromes, hormonal defects, and renal anomalies.

The importance of studying cryptorchidism arises from the fact that cryptorchidism is an important and the only well established risk factor for testicular cancer, some 10% of patients with testicular cancer having a history of the condition. Cryptorchidism is also closely

associated with infertility and subfertility. In a review of 27 papers that reported fertility following treatment for a unilateral undescended testis 31 percent of patients had oligospermia and 14 percent had azoospermia, in those who had undergone surgery for bilateral cryptorchidism, 31 percent had oligospermia and 42 percent had azoospermia (*Chilvers et al.*, 1986).

REVIEW OF LITERATURE

1. EMBRYOLOGY

1.1. EMBRYOLOGY OF THE GENITOURINARY TRACT

1.2. DIFFERENTIATION OF THE TESTIS

1.3. EMBRYOLOGY OF TESTICULAR DESCENT

EMBRYOLOGY

1.1. Embryology of the Genitourinary Tract: (Fig. 1)

The pronephros, mesonephros, metanephros and ureteral bud are the origin for the entire genitourinary system.

The pronephros is formed at the 4th week of gestation in the cervical region of the embryo. It disappears and it is replaced by the mesonephros at the 6th week of gestation.

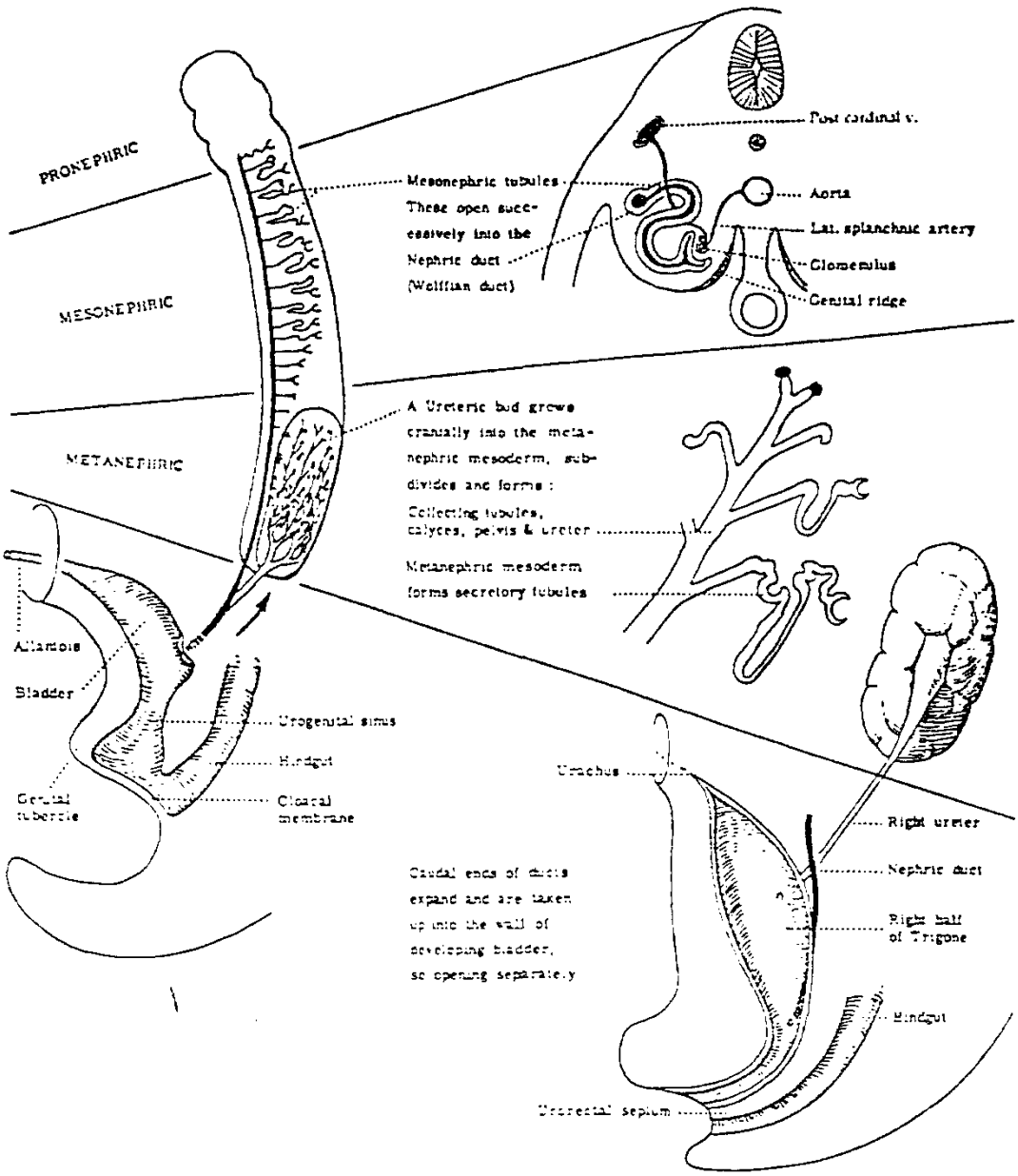
The mesonephros itself is composed of mesonephric tubules and mesonephric duct.

The mesonephric tubules are 70–80 S shaped tubules. The cranial 5/6 degenerates and gives rise to the suspensory ligament of the gonad.

The caudal 1/6 persists and gives rise to some genital structures (aberrant ductules, vasa efferentia and paradidymis in male).

The mesonephric duct persists (Wolffian duct) and gives rise to the genital ducts (epididymis, vas deferens, seminal vesicle and ejaculatory duct).

From the mesonephric duct, near its junction with the cloaca, the ureteric bud or duct arises as a hollow diverticulum and elongates



(Fig. 1): Embryology of the genito-urinary tract.

dorsally then turns cranially, its cranial end dilates and comes in contact with the caudal 1/4 of the intermediate mesoderm which overlaps the cranial end of the ureteric duct to form the metanephric cap.

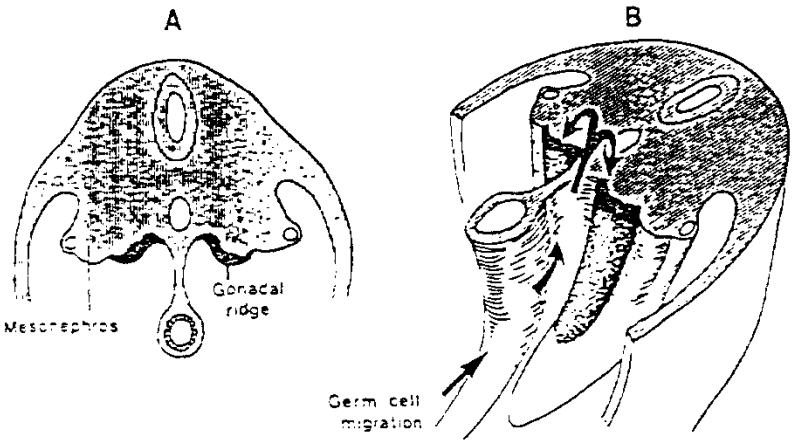
The ureteric duct forms the ureter, its cranial end dilates to form the funnel-shaped pelvis of the ureter.

The metanephric cap divides into small masses that cover the blind ends of the collecting ducts and it gives rise the future kidney of the embryo (*Smith et al.*, 1984).

1.2. Differentiation of the Testis

At approximately five weeks of age – 5 to 10 mm crown-rump (C-R) length – the genital system first appears as a thickening of the coelomic epithelium on the medial aspect of the mesonephros. This thickening is called the genital ridge. The germ cells, however, do not arise in this area; instead, they come from the yolk sac (Fig. 2-A).

By the sixth week of gestation the primordial germ cells migrate through the dorsal mesentery of the gut to reach the area of the genital ridge. Chemotaxis appears to be responsible for this directed migration, as has been reported by Josso (*Josso*, 1977) (Fig. 2-B).



(Fig. 2): A. Cross-section of embryo at five weeks demonstrating area of gonodal ridge.

B. Arrows indicate migration of germ cells from yolk sac to gonad.