COMPARATIVE STUDY OF DIFFERENT SURGICAL TECHNIQUES FOR REPAIR OF HYPOSPADIAS

ESSAY

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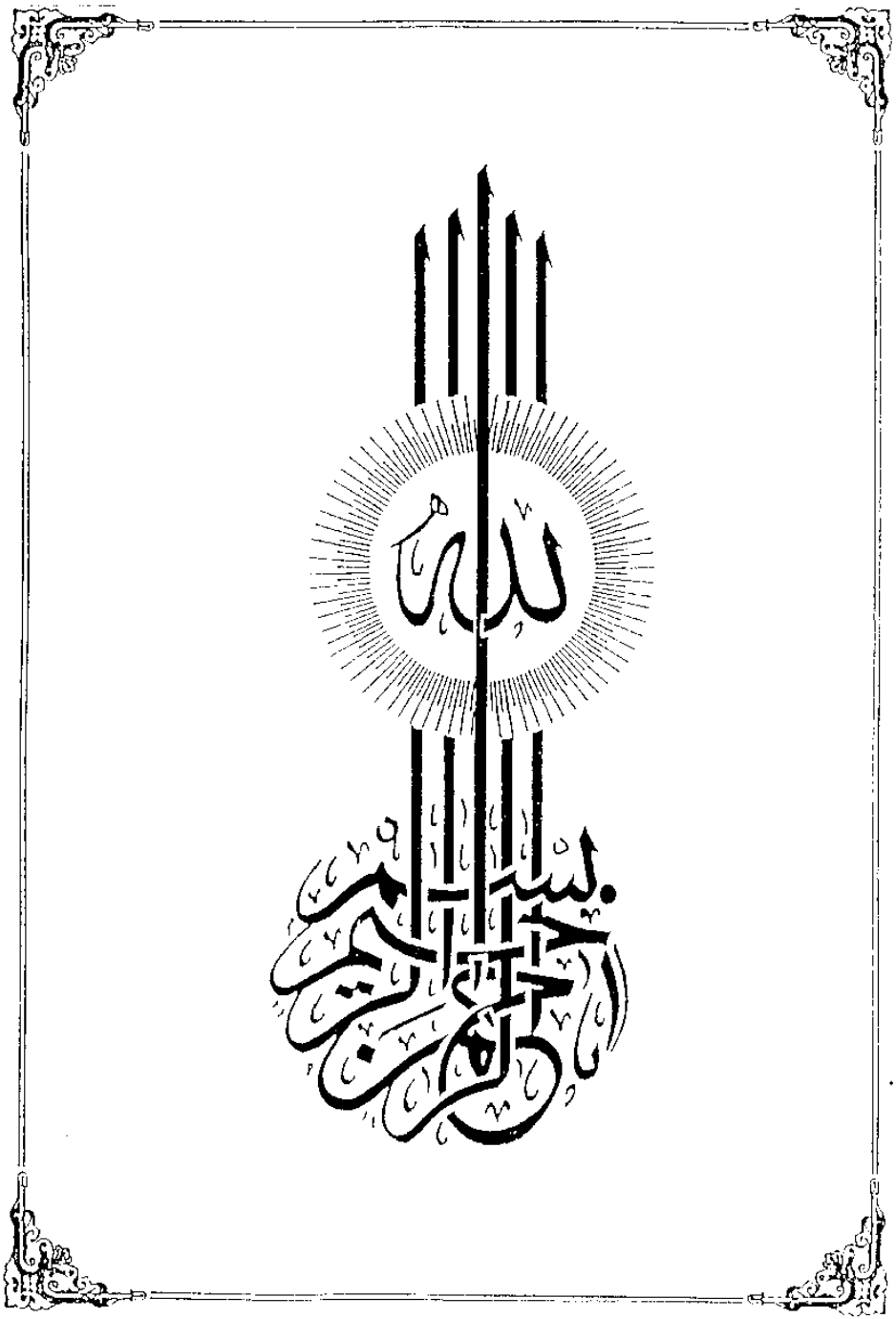

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CHAPTER 1

EMBRYOLOGY OF THE MALE EXTERNAL GENITALIA

The embryology of the human sex structures is characterized by 2 stages of development : an initial stage of gender indifference and a subsequent stage of male or female differentiation (Manstein, 1992).

Although rapidly developing, the gonads and the structures that develop along the genital tract remain identical for both males and females until genetically encoded directions alter their course (Manstein, 1992).

The cloacal folds continue to grow as the migratory mesoderm is blocked by the fused cloacal membrane. By the end of the 5th week (8 mm, embryo length) a conical genital tubercle appears in the ventral midline between cloacal membrane and allantois. (This tubercle will eventually elongates intto the phallus). At the same time a wedge of mesenchyme, the urorectal septum, becomes discernable. (Devine, 1980).

Posterolataeral anal tubercles also develop toward the end of the fifth week, and the lateral mesoderm proliferates to form urethral and genital folds. (Manstein, 1992).

Sexual differentiation is a sequential process that is intiated at conception. In the male, the change to testes does, however, await activation of the H-Y antigen (Josson et al., 1977).

A further requirement for male differentiation is that the testes be functional. They must produce hormones. Two secretions from fetal testes are responsible for the male phenotype. The 1st is termed "Mullerian regression hormone", which is a poorly characterized peptide hormone. This factor is responsible for the suppression of the paramesonepheric ducts (Josson et al., 1977).

The second and, far more crucial, factor is the secretion of androgenic steroids, possibly testosterone. It is believed that the hormonal synthesis is independent of gonadotropic control and that testosterone by itself is responsible for the virilization of the Wolffian duct system into the epididymis, ductus deferens, seminal vesicle, ejaculatory duct, ureter and pelvis of the kidney. It's metabolite, dihydrotestosterone, induces development of the prostate and male external genitalia (Wilson Jo et al., 1980).

When the genital tubercle is a midline mesodermal mass, it displays a shallow midline depression; this urethral groove extends the length of the tubercle. At the tipof the tubercle an epithelial tag forms from ectoderm. As the genital tuberch elongates, it carries the groove with it, maintaining the tag at its tip. It continues to become the phallus (Manstein, 1992).

The phallus project in a perpendicular manner to the abdominal wall. With elongation the urethral groove deepens from the opened urogenital ostium far out onto the shaft.

By 3 months, the urethral folds begin to close over the urethral groove, and the original urogenital ostium closes. The urethral groove seals together, and the tube of the urethra progresses distally with the urogenital ostium advancing before it. The penile urethra forms on the ventral surface of the genital tubercle. It is this progression of events that explains the anatomical location of the ostium of hypospadias (Devine, 1980)

Although most authorities believe that the urethra arises by fusion of the paired urethral folds after rupture of the urogenital membrane, recent investigative work contradicts this (VanderPutte, 1986).