POSTERIOR URETHRAL VALVES

ESSAY

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BY

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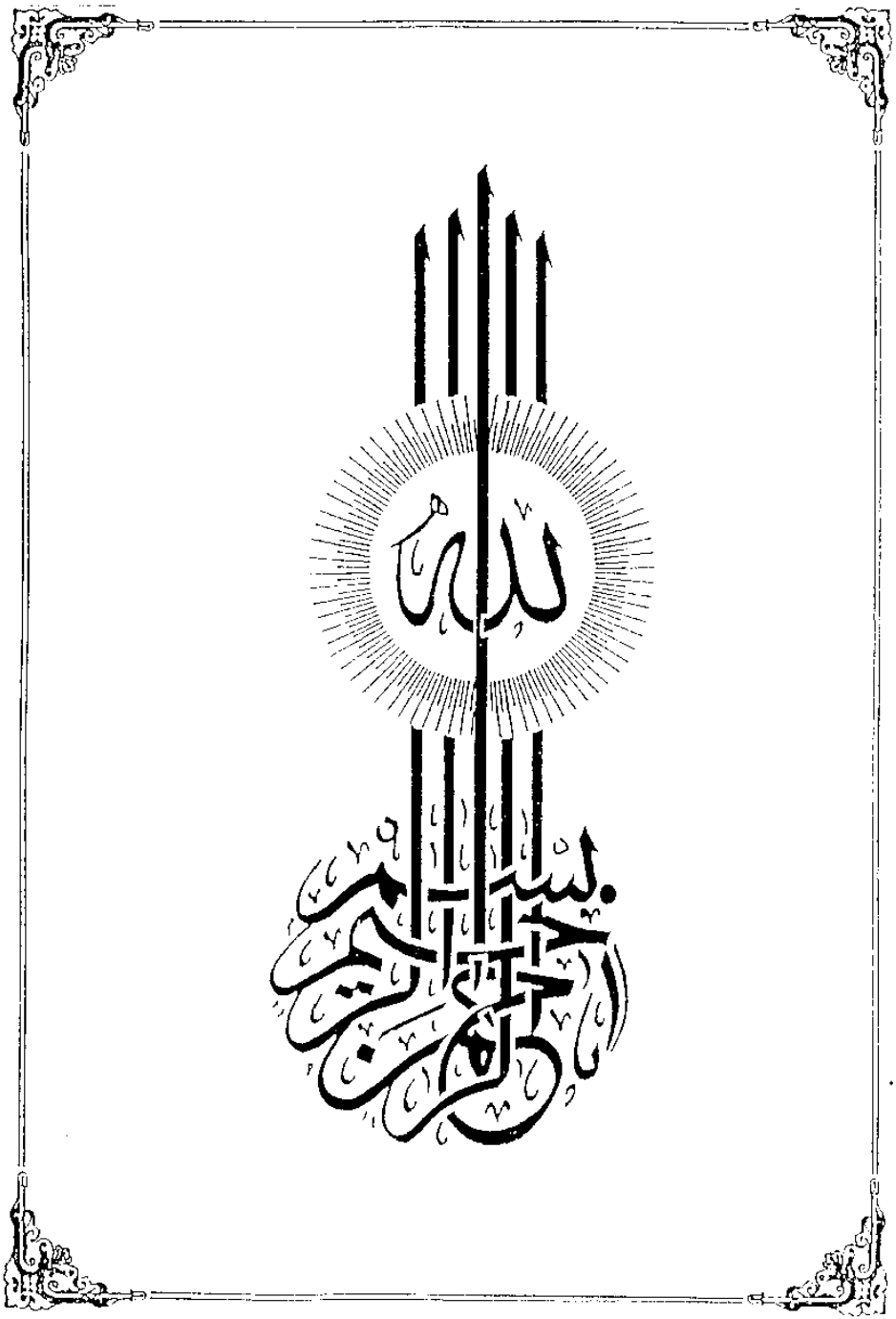

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INTRODUCTION

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The most common obstructive abnormality in male children affecting both kidneys is posterior urethral valves. It's high incidence has been recognised over the last two decades and during this period the management of this disorder has been evolving (**Glossberg, 1985**).

Infants born with posterior urethral valves often have upper urinary tract dilation and renal damage, that varies with the severity and duration of obstruction in utero **(Nakayoma et al., 1986)**.

With recent methods of investigation this lesion can be diagnosed prenatally and in neonates.

The incidence of other organ system anomalies is low in association with urethral valves. Most associated anomalies involve urinary tract itself and can be as a manifestation of primary defect. **(Gonzales, 1978)**.

The advent of reliable, infant sized miniature endoscopes and resectoscopes has made it possible to perform safe surgical treatment of valves in all children **(Kaplan and Brock, 1985)**.

Recently prenatal surgical interference can be done. So early and proper management may avoid many unpleasant sequelae, of this congenital anomaly.

EMBRYOLOGY OF MALE POSTERIOR URETHRA

Embryology of Male Posterior Urethra

Understanding the proposed embryology of urethral valves requires an appreciation of the sequence of developmental events that occur from early cloacal formation through final urogenital sinus differentiation (Gonzales, 1978). During this interval from the fourth to the twelfth week of gestation, numerous urinary and genital products as follow:

Normal embryology of male posterior urethra:

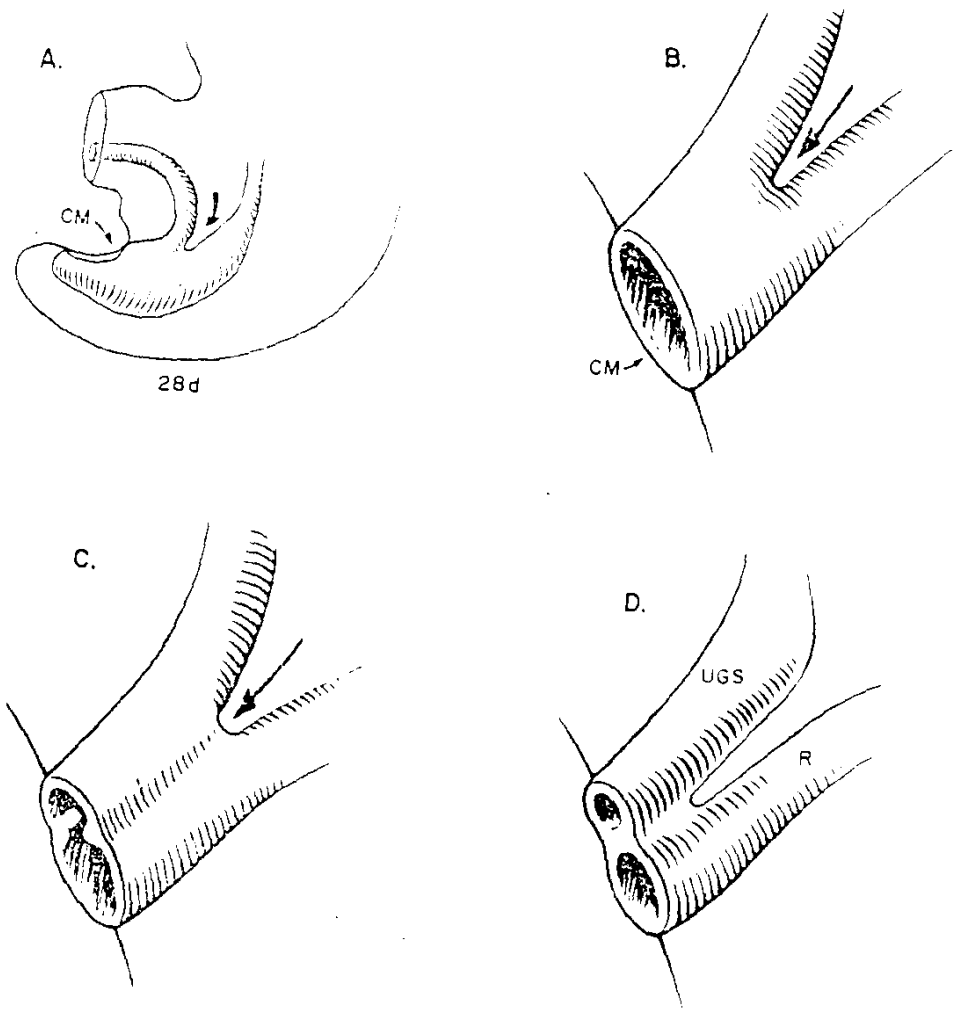
At four weeks of gestation (4mm fetus), a common cloacal cavity exists and is covered by the cloacal membrane. The mesonephric duct enters the lateral aspect of the anterior portion of this early structure soon (by 5 mm stage) an outpouching on the mesonephric duct will be evident, which represents the ureteral bud. At this time septation of the cloaca begins. A wedge of mesoderm the urorectal septum or tournux fold, extends in the coronal plane between the allantois and primitive hind gut and progresses caudally toward the cloacal membrane.

A separate rectum and primitve urogenital sinus appear by seven weeks (16 mm stage) of development. The portion of the primitive urogenital sinus cranial to the mesonephric ducts is the vesicourethral canal, that caudal to the mesonephric ducts is the definitive urogenital sinus.

The vesicourethral canal gives rise to most of urinary bladder and its caudal part gives rise to upper half of the prostatic urethra (till the openings of the ejaculatory ducts). The definitive urogenital sinus is divided into a narrow near the bladder called the pelvic urethra and an expanded portion near the urogenital membrane called the phallic urethra. The lower portion of the prostatic urethra and the membranous urethra are developed from the pelvic part of the urogenital sinus **(Maizels 1986).**

At the time of complete separation of the cloaca there are important changes that become evident. The ureters have separated from the mesonephric ducts, which will persist as the definitive male genital ductal system. The mesonephric duct have migrated posterolaterally and now enter the urogenital sinus a longside a small elevation on its posterior wall called Muller's tubercle. The mullerian ducts through present, have not yet reached the posterior wall of the urogenital sinus.

Subsequently, as the mullerian ducts continue their growth caudally, the epithelium on the underside of Muller's tubercle begins to proliferate rapidly and expands carnially into the surrounding mesenchyme to meet the lower ends of the fused mullerian ducts. These structure are called the sinovaginal bulbs.



(Figure 1)

Septation of the cloaca

(A) Lateral view of caudal embryo (CM, cloacal membrane). Septation of the cloacal occurs in a coronal plane as Tourneux's fold. (B) extends to the cloacal membrane from above and (C) as Rathke's plicae extend toward each other from the sides (D) septation establishes the primitive urogenital sinus (UGS) and rectum (R). (**Maizels, 1986**).

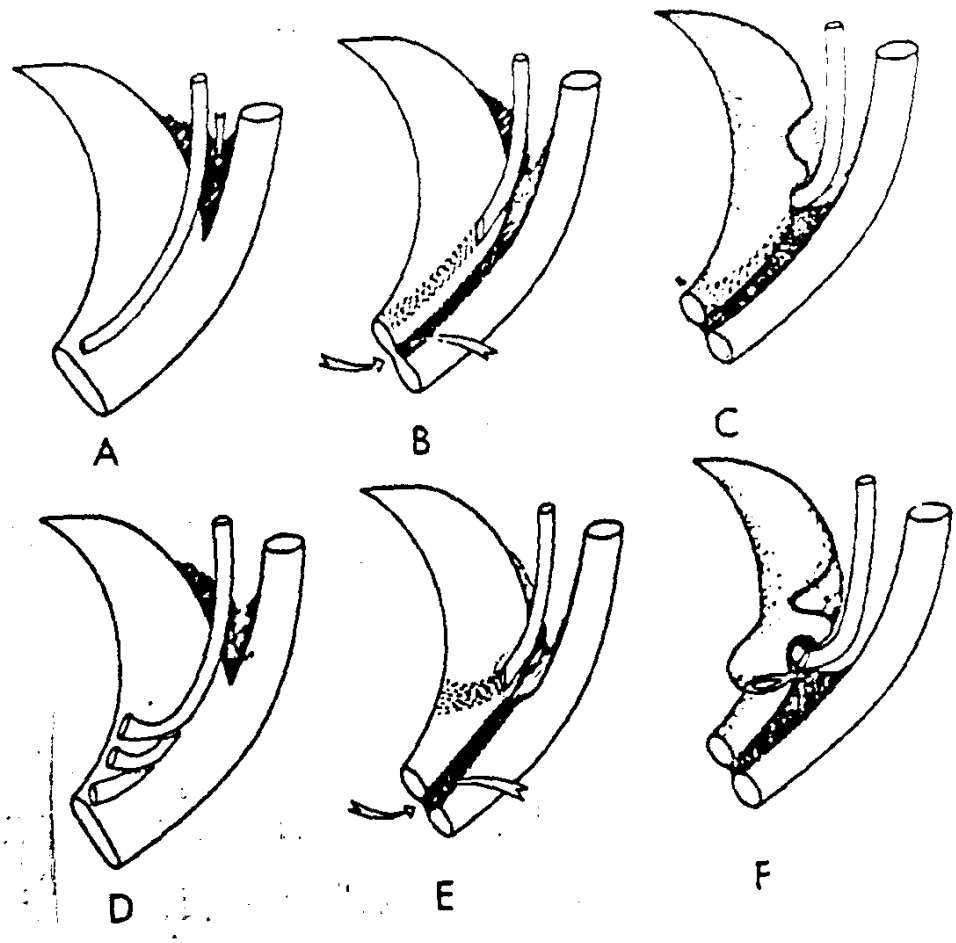
Near the eleventh week of gestation (68 mm stage) the sinovaginal bulbs are prominent, and distinct folds have developed in the lateral walls of the urogenital sinus, running from the inferior edge of Muller's tubercle, which is posterior to near the orifices of the bulbourethral glands (Cowper's gland in the male) which have appeared on the anterior wall of the sinus during the third month. These folds are called the urethrovaginal folds. The folds migrate posterolaterally along with the ducts of Cowper's glands and persist as the plicae calliculi.

Embryogenesis of Posterior Urethral Valves

Many theories have been suggested to explain the origin of the posterior urethral valves. The most popular and acceptable concept to explain the development of type I valves is due to failure of posterolateral migration of the urethrovaginal folds with fusion of the distal (or anterior) extension of these folds. This explain the bifid nature of the valve, the anteriorly placed membrane that extends into the membranous urethra, the constant attachement of the valve to the inferior edge of the verumontanum, the observed absence of plicae calliculi in patients with posterior urethral valves, and the tendency for lumen always to be located posteriorly. (**Gonzales, 1978**).

"Young 1919" believes that their origin is from the urogenital sinus which in male remains as plical vestiges with radial insertions into the bulbous urethra.

"Stephens" on the other hand believes that origin of urethrovaginal folds is from the end of the mesonephric duct. He said that these folds represent the path of migration of the mesonephric ducts, as after the mesonephric ducts fuse with the urogenital sinus, they regress before terminating in the vermontanum as ejaculatory ducts.



(Figure 2)

Development of type I valves

(A.C) Development of the normal urethral crest. Migration of the orifice of the worlffion duct from its anterolateral position in the cloaca to the site of the Muller tubercle on the posterior wall of the urorectal septum occurs synchronously with cloacal division. (Dots denote pathway of migration). This wolffian remmant is more lateral and posterior and remains as the normal inferior crest and the plicae colliculi. (D) Abnormal anterior positions of the wolffian duct orifices (E) Abnormal migration of the terminal ends of the ducts (F) Circumferential obliquely oriented ridges that compose the valve.

(Duckett and Snow, 1986)

Their path of regression may be noted via plicae colliculi into the crista urethralis. Incomplete regression results in residual or substantive folds that act as urethral valves (Stephnes, 1983).

Type III valves are thought to occur when there is inadequate resolution of the urogenital membrane. (Gonzales, 1978).

"Graham and associates 1982" mentioned that type III valves probably represent marked fusion of type I valve.

"Livne et al., 1983" suggested a genetic etiology of posterior urethral valves. By reviewing the literature found 6 pairs of twins and 3 pairs of siblings with type I posterior urethral valves. Of the twins there are 3 pairs that has no established monozygocity. "Grajensky and Glassberg 1982" reported another case of posterior urethral valves in one pair of identical twins.

Also "Doraiswamy and AlBadr 1983" reported a case of posterior urethral valves in siblings aged 3 and 14 years.

However it is not possible to make final genetic conclusions but it undoubtedly seems that genetic have a major role in the development of this disorder but it appears that there are multiple factors.

ANATOMY OF MALE

POSTERIOR URETHRA