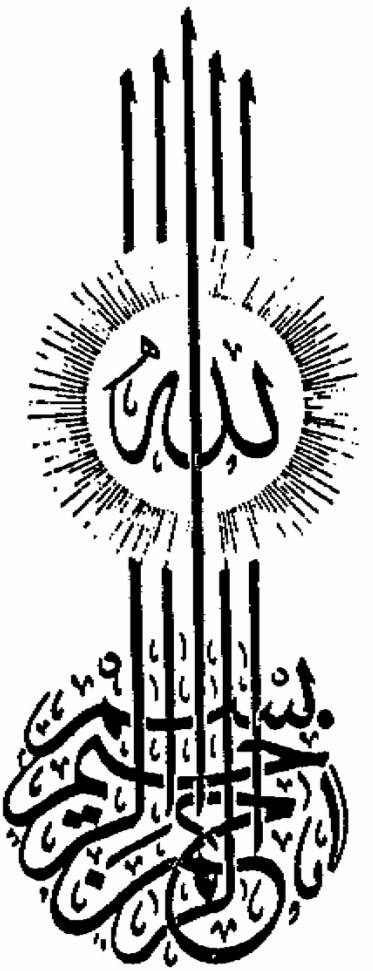

THE UROLOGIC COMPLICATIONS OF IMPERFORATE ANUS AND CLOACAL DYSGENESIS

Review submitted for partial fulfilment of M. S. degree in Urology .

BY

Dr. MOSTAFA M. EL MAHDY

M.B. B.CH.

THE SUPERVISOR :

FAROUK M. FAHMY

Professor of urology

Ain Shams University .

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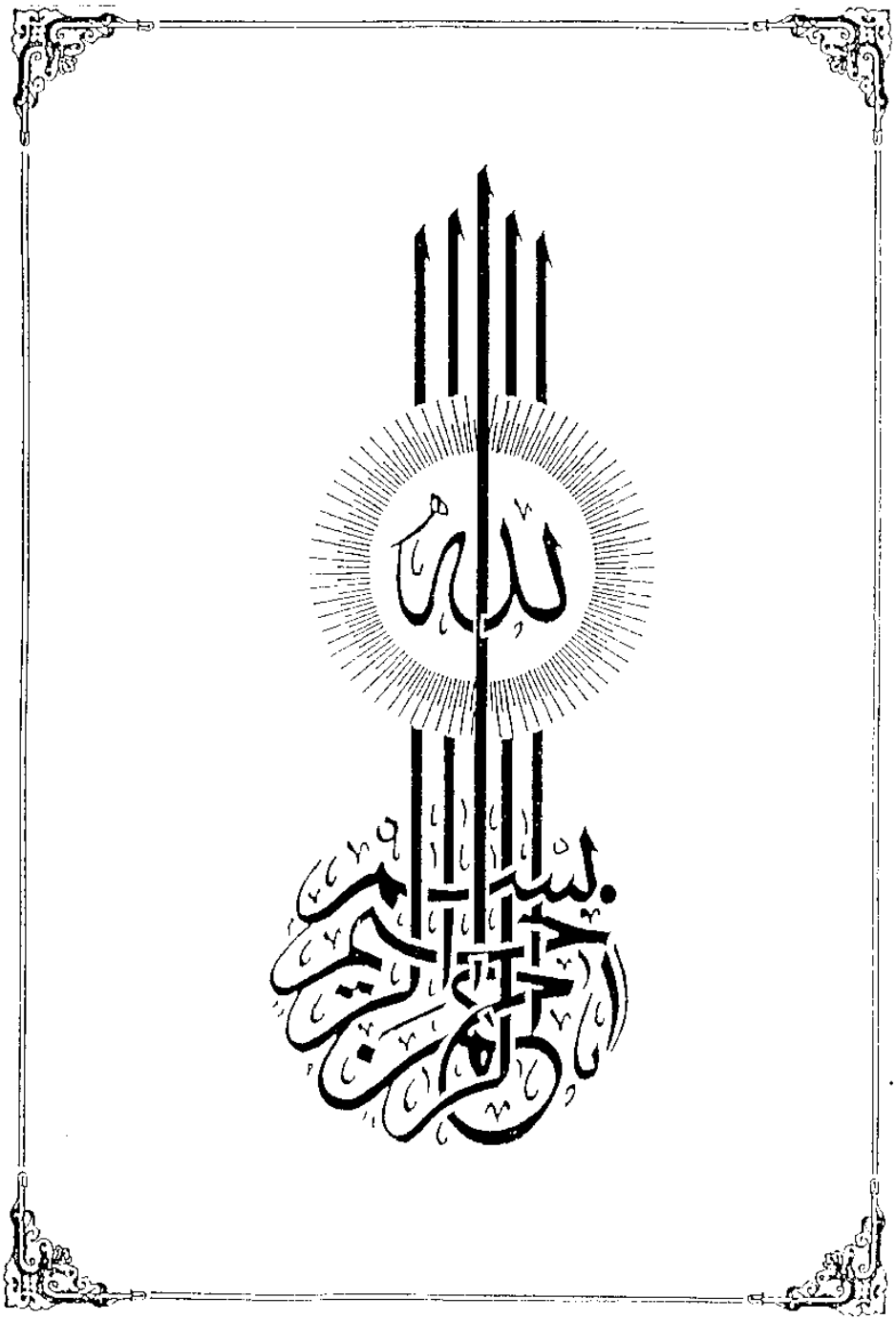

DEDICATED TO :-

MY FATHER

For the uncompromising principles that guided his life.

MY MOTHER

For leading her children into intellectual pursuits.

MY WIFE

For her magnificent devotion to her family .

MY DAUGHTERS

For making everything worthwhile .

ACKNOWLEDGMENT

Thanks and gratefulness will not be enough words to express my great indebtdness to my professor Dr. FAROUK M. FAHMY ,

Without his kind supervision and continuous support this work could not see the light .

I wish to express my deep thanks to all members of the urology department for their great and fruitful help .

ITEMS OF THE REVIEW

-- I N T R O D U C T I O N -

INTRODUCTION

The close relation in the development of the lower urogenital tract, distal alimentary canal and terminal spinal cord and cauda equina often leads to interrelated anomalies if arrest or deviation occurs during their development .

Occult vesical dysfunction resulting from developmental abnormalities involving the innervation of the detrusor muscle and external sphincter is commonly present in association with high imperforate anus and recto-urethral fistula .

Renal damage secondary to structural and physiologic defects in the urinary tract of the male with imperforate anus is often potentiated by fecal contamination through fistulous connections between the distal rectal pouch and the bladder or urethra .

- E M B R Y O L O G Y -

EMBRYOLOGY

1- The cloaca

The cloaca (Latin-a sewer) is appropriately named as it is a cavity common to both urogenital and alimentary system into which open in the early stages of development, the allantois and the hind gut.

The cloaca is seen initially in the embryo at 4 weeks of development as a part of the hindgut lying caudal to the allantoic opening. It is in this state when it may be seen in lower animals serving as a common passage for fecal urinary and reproductive products .

Its lumen is separated from the amniotic cavity by a thin cloacal membrane, which is present much earlier in development as a small area into which mesoderm from the primitive streak does not penetrate so that the endoderm and ectoderm come into contact .

The allantois is a blind-ended diverticulum of endoderm that projects into the mesoderm of the body stalk(connecting stalk). In many animals the endodermal diverticulum is large and important, acting as a reservoir for waste products but in man it is vestigial although it is still associated with the development of the excretory system .

During the fifth week of intrauterine life the cloaca subdivides into the dorsal rectum and the ventral urogenital sinus by ingrowth of the urorectal folds into the cephalic part of the cloaca where the allantois and the hindgut meet . (fig. 1)
Completion of this separation divides the cloacal membrane into the urogenital sinus and proctodeal membrane .
These membranes rupture at the seventh week of intrauterine life and the urogenital sinus and anus open separately onto the perineum .(fig. 1)
Subsequently, the allantois dilates and becomes the bladder .
The müllerian ducts fuse and meet the urogenital sinus at the müllerian tubercle .
Eventually this junction is excavated and the vaginal lumen is separated from the urogenital sinus by a thin membrane which will become the hymen .
Somewhat later (3 months) formation of the urovaginal septum divides the bladder and urethra anteriorly from the uterus and vagina posteriorly .(fig. 1)
When the urorectal fold reaches the cloacal membrane the perineal body is formed, separating the anal opening from the vaginal introitus .

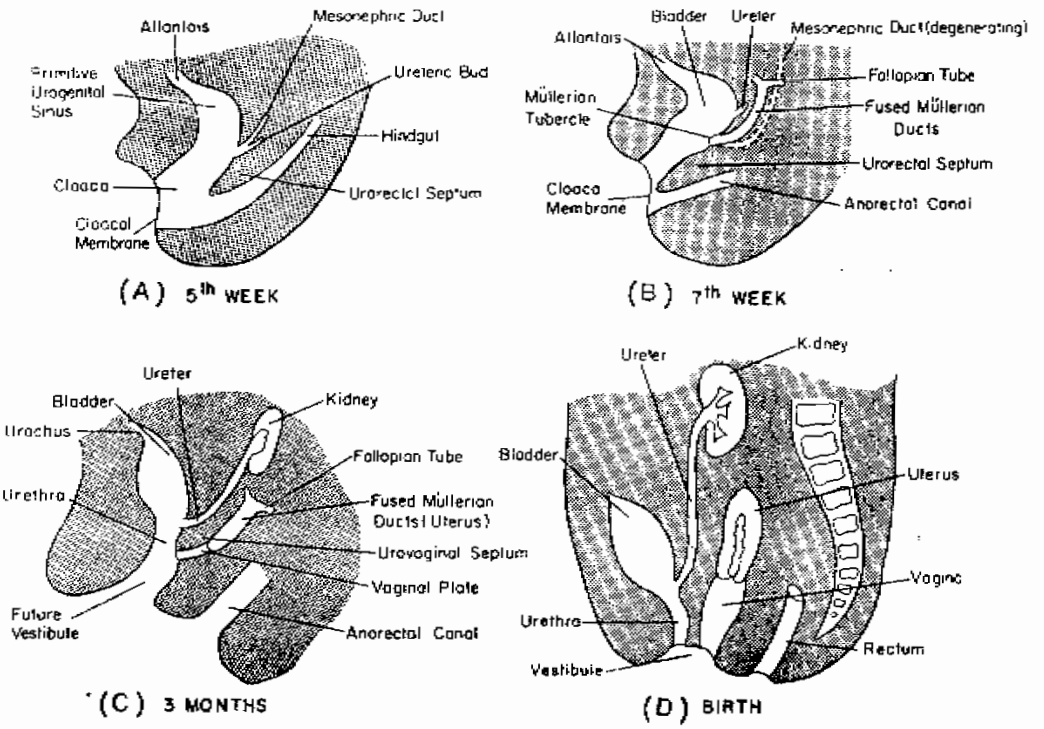

FIG (1) Schematic drawings showing the normal development of the urinary,genital and distal alimentary systems in the female .

(A) Relationship of the cloaca to the urogenital system and hindgut at 5 weeks .

(B) The fusion of the urorectal septum to the cloacal membrane at the 7-8th week stage completely separates the dorsal anorectal canal and ventral urogenital sinus resulting in 2 independent orifices as the cloacal membrane ruptures .

(C) At 3 months there is beginning separation of the vagina and uterus dorsally from the bladder and urethra ventrally by the urovaginal septum .

(D) At the time of birth,the separation of the urinary and genital tracts is complete with each opening separately into the vestibule .

2- The urogenital sinus

The urorectal septum grows down between the primitive urogenital sinus and the hindgut until it reaches the cloacal membrane. The septum thus separates the gut from the developing urogenital system and divides the cloacal membrane into an anal and a urogenital membrane .

The urogenital membrane extends as far forwards and cranially as the attachment of the umbilical cord so that at this stage it faces forwards and there is no infraumbilical abdominal wall .

Owing to this mode of separation of the cloaca into its two components, no large blood vessels pass through the region of the urorectal septum so that a useful plane of cleavage is present in the adult (fascia of Denonvilliers) .

The primitive urogenital sinus now changes its shape somewhat, becoming subdivided into a rather cylindrical vesico-urethral canal above the level of the openings of the mesonephric ducts and a definitive urogenital sinus below these openings. The definitive urogenital sinus is subdivided into a short narrow cylindrical portion,the pelvic part (pars pelvina) and a more extensive phallic part (pars phallica) which is flattened from side to side . (fig.2)

Mesoderm from the most caudal part of the primitive streak grows forwards on either side of the urogenital membrane and proliferates to form a pair of genital swellings, while anteriorly this mesoderm passes between the endoderm and the ectoderm of the cloacal membrane to form a pair of swellings covered with ectoderm , which soon fuse to form a single mid-line eminence known as the genital tubercle . (fig.3) Behind this is therefore placed the urogenital membrane between the two genital swellings while in front and above it is the attachment of the umbilical cord, for there is still no infra-umbilical anterior abdominal wall .

A little later, however this part of the abdominal wall develops by the ingrowth of more mesocermal cells between the endoderm and ectoderm and much later developing muscle cells from the mesodermal somites will invade this mesoderm to form the abdominal musculature .

It is important to realize that if mesoderm does not grow forwards from the primitive streak to form the genital tubercle and the infra-umbilical part of the abcominal wall there will be a region below the umbilicus where a membrane, the original cloacal membrane, composed only of ectoderm and endoderm , will exist .

It is the formation of the infra-umbilical part of the abdominal wall that rotates the plane of the cloacal membrane so that it faces, downwards , between the legs rather than forwards below the umbilicus .

The genital tubercle is large and is recognizable as a phallus, Medial to the genital swellings is a pair of thin urethral folds that flank the opening of the urogenital sinus .(fig.3)
The urogenital membrane have disintegrated .
The phallic part of the urogenital sinus extends forwards onto the ventral surface of the genital tubercle and is continuous further forwards with an ectodermal groove.
This is called the urethral groove and it is limited on either side by a forward prolongation of the urethral folds .