

URINARY BLADDER LESIONS BY CONVENTIONAL RADIOGRAPHY & ULTRASONOGRAPHY

THESIS

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INTRODUCTION AND AIM OF WORK

Diagnostic ultrasound is a simple non-invasive technique. It adds information about urinary bladder lesions which have already been detected by conventional radiology. In addition it may be useful in the diagnosis of small lesions.

The aim of this work is to outline the role of ultrasound as complementary to diagnostic radiology, in different bladder pathological conditions.

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EMBRYOLOGY AND ANATOMY

1-EMBRYOLOGY OF THE BLADDER

The Cloaca

The primitive cloaca is formed by the distal part of the digestive tract, the hindgut. It receives the allantois (allantoic stalk) and the paired wolffian ducts (with their ureteral buds). It is separated from the outside by the cloacal membrane. The urorectal septum (urogenital septum, urogenital fold, or mesoderm) grown towards the cloacal membrane, separating the cloaca into the rectum (posterior) and the urogenital sinus. The site of the fusion of the urorectal septum with the cloacal membrane becomes the perineal body. The part of the cloacal membrane anterior to the point of fusion is called the urogenital membrane, the part posterior, the anal membrane. The connection between the rectum and urogenital sinus (just before they are completely divided from each other by the urorectal septum) is called the cloacal duct. (Fig 1 & 2)

The Urogenital Sinus

The urogenital sinus may be subdivided into two parts. (1) the proximal portion above the opening of the wolffian ducts (Muller's tubercle in the undifferentiated embryo, the seminal colliculus or verumontanum in the adult male, or the hymen in the female) develops into the bladder and prostatic urethra in the male and

the bladder and entire urethra in the female. (2) The distal portion (the urogenital sinus proper or definitive urogenital sinus) becomes the remainder of the urethra (the cavernous urethra) in the male and is represented by the introitus or vestibule in the female. (Emmett , 1977) (Fig 3).

The narrowed apex of the bladder continuous with the allantoic stalk at the umbilicus is called the urachus. In an early developmental stage this structure undergoes regression that normally results in complete obliteration. Failure to obliterate results in a patent urachus (urachal fistula) or urachal cysts.

As the urorectal septum reaches the cloacal membrane (six to seven weeks; 11mm, embryo), the membrane ruptures, with the creation of two separate excretory orifices. An abnormally large over developed or persistent cloacal membrane is believed to form a wedge preventing mesodermal growth at this stage and thus to bring about exstrophy or epispadias.

Persistent cloaca results from incomplete opening of the cloacal membrane. Failure of the rectum and urogenital sinus to separate completely in the female most commonly causes a vestibulorectal fistula, and in the male rectovesical or rectourethral fistula. Retention of the anal portion of the cloacal membrane causes imperforate anus. Vesical exstrophy, absence, duplication, or sub-division of the bladder may occur, whereas ectopic variations

in ureteral openings result from abnormalities in vesical and urogenital sinus development.(Campbell ,1978)

11-ANATOMY OF THE URINARY BLADDER

A- Position

It is situated in the anterior part of the pelvic cavity, lies behind and above the symphysis pubis, its exact position depends largely upon the degree of distention. When empty it is small and adjacent to the symphysis pubis, when full, it dilates to form an ovoid organ rising to the level of the lower ends of the sacro-iliac joints, the upper part forming the fundus and the lower part is behind the symphysis pubis forming the neck of the bladder, where it joins the urethra, through which the contents of the bladder are voided. The position of the bladder changes from infancy to adulthood. In infancy it is primarily an abdominal structure, by 6 years of age the greater part of the urinary bladder is ordinarily accommodated by the pelvis, but it is not wholly a pelvic organ until shortly after puberty. This is actually a relative change, since there occurs not only a change in the shape of the bladder but also in the contour of the bony pelvis. When adulthood is approached, pubic expansion and evolution of the sacral curve occurs, along with tilting, broadening and deepening of the pelvis. Therefore, the bladder acquires the pelvic position through this change of relationship and shape rather than by true descent. Obviously, since the bladder is supported by prostate in the male, it occupies a more abdominal position in the male than it does in the female. (Meschan, 1966)

The Bladder is a hollow muscular organ lined by a mucous coat. The muscle wall is composed of plain muscle fibres, separated by very loose submucous tissue from the mucous coat. The bladder lies immediately in front of the rectum and when empty, behind the pubic bones; As it fills it rises above the linea terminalis, in the space between the transversalis fascia and peritoneum.

The bladder is made of smooth muscle arranged in whorls and spirals; the detrusor muscle is adapted for mass contractions, not peristalsis. The muscle is lined by a loose and readily distensible mucous membrane, surfaced by transitional epithelium. The form and size of the bladder are the same in both sexes, but the attachments of its base and the posterior relations of the viscus require separate consideration in male and female. In each the trigone is fixed and the fundus varies in size above this in accordance with the volume of the contained urine. The distended bladder is globular (ovoid) in both sexes, while the empty bladder is flattened from above downwards by the pressure of the overlying intestine. (Campbell , 1978).

The fundus lies behind the bodies of the pubic bones; during distension it rises over the upper border of the pubis. The fundus is held in position by the tone of its muscular walls on the fixed part of the trigone.

