RENAL TUMOURS

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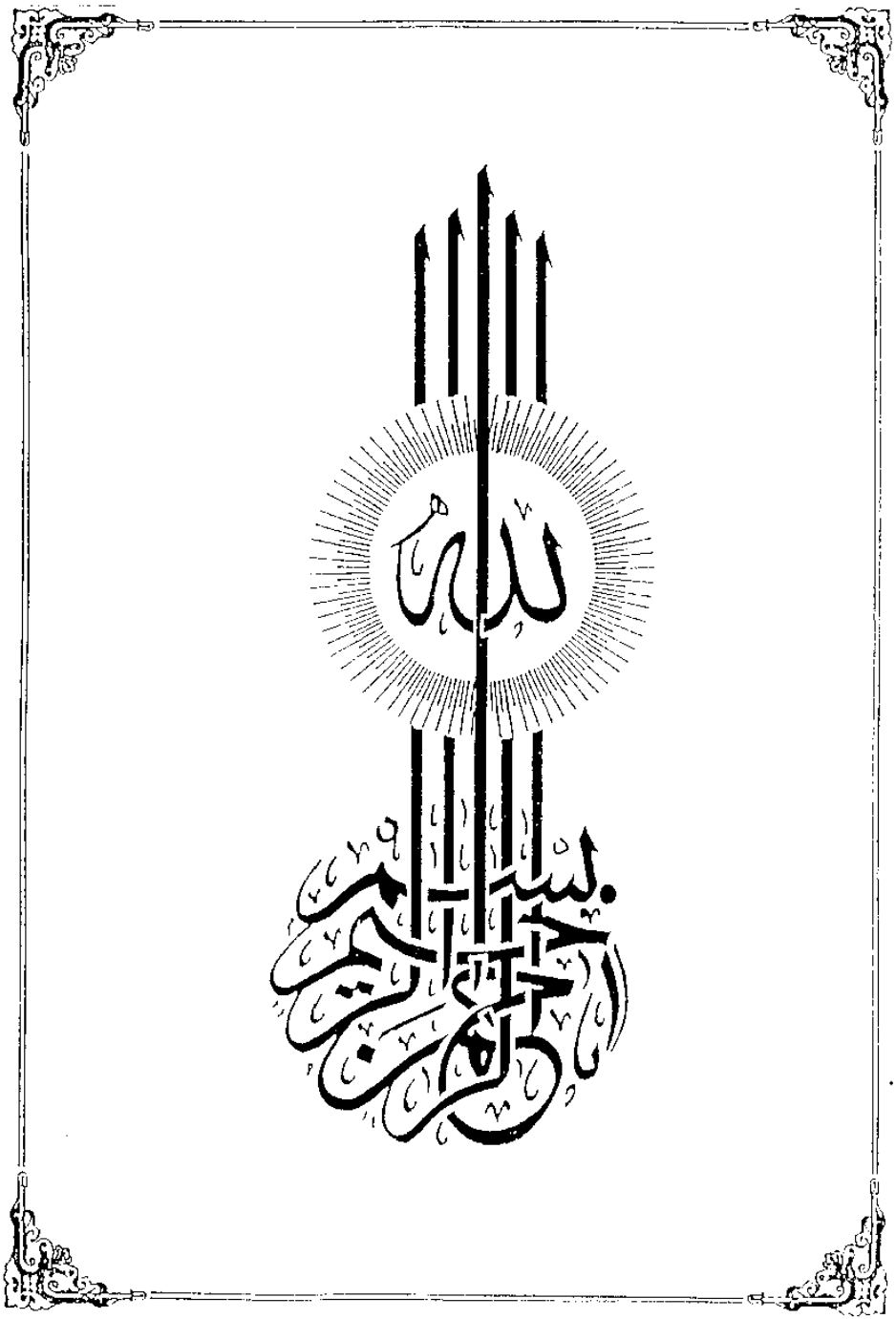

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TO MY PARENTS
MY WIFE
AND MY SONS

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INTRODUCTION

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Benign renal tumours are rare. Most of the renal tumours are malignant. There are two different types of neoplasms arising in the kidney, those which occur in renal parenchyma and those arising from the pelvis of the kidney.

Primary malignant neoplasms of the kidney are ranging thirteenth among human cancers. Approximately 1.5 % of all human cancers arise in the kidney . ***(Bennington and Beckwith, 1984).***

Malignant tumours of the kidney itself are much commoner than of the pelvis, and nearly 20 % of them are carcinomas. They may be classified pathologically into those of childhood, most common of which are nephroblastic tumors, and those of adulthood, most frequent of which are epithelial tumors of renal parenchyma. ***(Mostofi, 1984).***

Two destinct parenchymal tumours are seen, that which arises in childhood, the embryoma (Wilms' tumour) being a highly malignant mixed tumor, and tumors occuring in adulthood, the renal cell carcinoma or adenocarcinoma (Grawitz'tumor). About 80 % of renal neoplasms are adenocarcinoma and occur more frequently in men than in women. ***(Bennington and Beckwith, 1984).***

Renal carcinoma is usually taken to mean carcinoma of the renal parenchyma, and to exclude carcinoma of the renal pelvis, but if there is any possibility of confusion the expression renal parenchymal carcinoma can be used. ***(Bennington and Beckwith, 1984).***

Tumours of the collecting system comprise 10 % of renal neoplasm. Renal sarcomas are rare but the secondary tumors e.g. lymphomatous and metastatic tumors occasionally involve the kidney. ***Bennington and Beckwith, 1984).***

Various classifications have been adopted in an effort to acknowledge and include the various tumors of diverse causes that can afflict the human kidney. ***(Bennington and Beckwith, 1984).***

An effort must be made, however, to provide a classification that is both complete and uncomplicated, embracing all the lesions that predispose to renal mass. ***(Bennington and Beckwith, 1984).***

BRIEF ANATOMY OF THE KIDNEYS

The kidneys lie high up on the posterior abdominal wall behind the peritoneum, largely under cover of the costal margin. At best only their lower poles can be palpated in the normal individual. Each kidney lies obliquely, with its long axis parallel with the lateral border of psoas major. On its vascular pedicle it lies well back in the paravertebral gutter, so that the hilum faces somewhat forwards as well as medially. As a result of this slight rotation of the kindey, an anteroposterior radiograph gives a somewhat foreshortened picture of the width of the kidney. The normal kidney measures about 12 x 6 x 3 cm (4 x 2 x 1 in) and weighs about 130g (4 oz). The hilum of the right kidney lies just below and of the left just above the transpyloric plane (2 in) 5 cm from the midline; these are the surface markings of the hila. The bulk of the right lobe of the liver accounts for the lower position of the right kidney. The upper pole of the left kidney may overlie the eleventh rib in a radiograph, that of the right kidney seldom ascends so high, though it must be remembered that each kidney moves in a vertical range of 2 cm (about 1 in) during full respiratory excrusion of the diaphragm. ***(Mc Minn R. M. H., 1990).***

The kidney possesses a capsule which gives the fresh organ a glistening appearance. All surfaces are usually smooth and convex though traces of lobulation, normal in the foetus, are often seen. Thick rounded lips of kidney substance bound the hilum, from which the pelvis emerges behind the vessels to pass down into the ureter.***(Mc Minn R. M. H., 1990).***

Relations:

The relations of the kidneys are roughly symmetrical. Posteriorly the relations are the same, comprising mostly the diaphragm and quadratus lumborum muscles, with overlap medially on to psoas and laterally on to transversus abdominis. The upper pole lies on those fibres of the diaphragm which arise from the lateral and medial arcuate ligaments. Thus the posterior recess of the pelura lies posteriorly, a point of importance in posterior approaches to the kidney. ***(Mc Minn R. M. H., 1990).***

The subcostal vein, artery and nerve, on emerging beneath the lateral arcuate ligament, lie behind the posterior surface of the kidney, as do the ilio hypogastric and ilio inguinal nerves as they emerge from the lateral border of psoas. (The lateral femoral cutaneous nerve is normally too low to be a psoterior relation). The upper lumbar arteries and veins lie behind the quadratus lumborum and thus are more distant from the kidney. ***(Mc Minn R. M. H., 1990).***

The hilum of the kidney lies over psoas and the convexity of the lateral border lies on the aponeurosis of origin of transversus abdominis. The suprarenal glands lie somewhat asymmetrically. The right gland, pyramidal in shape, surmounts the upper pole of the right kidney behind the inferior vena cava and the bare area of the liver, while the left gland, crescentic in shape, is applied to the medial border of the left kidney above its hilum behind the peritoneum of the posterior wall of the lesser sac. (***Mc Minn R. M. H. 1990).***

The anterior relations of the two kidneys are more symmetrical than appears at first sight and may be studied simultaneously with advantage. On each side the peritoneum of the posterior abdominal wall lies in contact

with certain areas of the kidney, while intervening structures of force it away from the kidney in other areas. The hilum is separated from the peritoneum, on the right side by the second part of the duodenum and on the left side by the tail of the panoreas. The lateral part of the lower pole is separated from peritoneum by the hepatic and splenic flexures of the colon on the right and left sides respectively. The medial part of the lower pole, On each side, lies in contact with peritoneum which separates it from coils of jejunum; here, between peritoneum and kidney, is an artery, the Ascending branch of the right colic and of the upper left colic arteries respectively. The upper halves of each kidney, up to the superior pole, lie in contact wth peritoneum. On the right kidney is the peritoneum of the hepatorenal pouch (part of the greater sac), in contact with the under surface of the liver. The upper part of the left kidney, over a triangular area between the suprarenal gland, spleen and pancreas, is covered by peritoneum of the lesser sac and so forms part of the stomach bed, with the lienorenal ligament passing forwards near the lateral margin of the kidney. ***(Mc Minn R. M. H., 1990).***

The perinephric fat lies outside the renal capsule and is, at body temperature, of rather more solid consistency than the general body fat. It is in the shape of an inverted cone, filling the funnel shaped hollow of the suprailiac part of the paravretebral gutter, and it plays a part in retaining the kidney in position. The development of nephroptosis (floating kidney) after severe loss of weight is thus explained. ***(Mc Minn R.M.H.,1990).***

The renal fascia surrounds the perinephric fat and separates the kidney from the suprarenal gland. It is no very obvious membrane in the living, but appears more convincingly in the coagulated dissecting room cadaver.

In truth it is little more than a vague condensation of the areolar tissue between the parietal peritoneum, and the posterior abdominal wall, but certain of its attachments are worthy of note, since they serve to restrain the extension of the perinephric abscess. At the hilum of the kidney the fascia is firmly attached to the renal vessels and the ureter, a further factor in stabilizing the kidney and in discouraging spread of pus across the midline. It ascends as a dome between the upper pole of the kidney and the suprarenal, and explains why in nephrectomy the latter gland is not usually displaced (or even seen) It is usually described as deficient below when traced downwards, but it is far better to regard it as being obliterated by the areolar tissue which connects the peirtoneum to the posterior abdominal wall. Pus in the perinephrtic space does not track downwards, and injections into the space do not flow downwards. ***Mc Minn R.M.H., 1990).***

Similar remarks apply to an alleged layer of fascia passing between the anterior surfaces of the dome shaped renal fascial in front of the aorta and inferior vena cava, this layer is no more than the areolar tissue that attaches the parietal peritoneum to all the structures on the posterior abdominal wall.

Renal pelvis:

This can be regarded as the funnel shaped upper expansion of the ureter, and is the most posterior of the main structures in the hilum. It is dilated in its upper and lower extremities into two or three major calyces into which drain a dozen or so minor calyces, each receiving a renal papilla. The pelvis, like the ureter is lined by transitional epithelium and there is smooth muscle as well as connective tissue in its wall. Recent studies suggest that specialized muscle cells in the walls of the minor

calyces act as "pacemakers" that initiate contractile waves which pass down into the ureter. The capacity of the average pelvis is less than 5 ml. Note that its proper name is the renal pelvis, not the pelvis of the ureter. ***(Mc Minn R.M.H., 1990).***

Blood supply and segments:

The wide-bored renal arteries have a blood flow in excess of 1 litre per minute. They leave the abdominal aorta at right angles and lie behind the pancreas and renal veins. ***(Snyder et al., 1992).***

Based on its blood supply, each kidney possesses fine segments. In the region of the hilum the artery typically gives rise to an anterior and a posterior division. The posterior division supplies the posterior segment, while the anterior one gives branches that supply the apical , upper, middle and lower segments. The standard pattern in frequently modified by the way the vessels branch e.g. the vessels to more than one segment may arise from a common stem and several variations are possible but there are always five segments with no collateral circulation between them (as originally noted between the anterior and posterior divisions by Brodel the bloodless plane). Abnormal or aberrant renal arteries such as a vessele running from the aorta to the lower pole, are in fact segmental vessels with an unusual origin (persistence of a fetal vessele). They are not usually accompanied by veins. ***(Snyder et al., 1992).***

Veins from the renal segments communicat with one another profusely (unlike the arteries) and eventually form five or six vessels that unite at the bilum to form the single renal vein. The usual order of structures in the hilum of each kidney is vein, artery, ureter from front to back. ***(Snyder et al., 1992).***

Lymph drainge :

The lymphatics of the kidney drain to para-aortic nodes at the level of origin of the renal arteries (L2). The surface of the upper pole may drain through the diaphragm into nodes in the posterior mediastium. ***(Snyder et al., 1992).***

Nerve Supply:

Renal nerves are derived from both parts of the autonomic system. The sympathetic preganglionic cells lie in the spinal cord from T_{12} to L_1 segments and they send preganglionic fibres to the thoracic and lumbar splanchnic nerves. The post ganglionic cells are in the celiac, renal and superior hypogastric plexuses and for the lowest splanchnic nerve, in the renal ganglion in the hilum of the kidney. They are vasomotor in function. Afferent fibres, including those subserving pain, accompany the sympathetic nerves as for most other viscera. Thus the pathway for the pain of renal colic from a stone in the calyces or renal pelvis may run along blood vessels to the coeliac plexus and thence by the splanchnic nerves to the sympathetic trunk and via white rami communicanes to T_{12}- L_1 spinal nerves, and so into the spinal cord by the posterior nerve roots. The pain may radiate from the back and lumbar region to the anterior abdominal wall and down to the external genitalia. There is some parasympathetic supply from the vagus of uncertain function but it is possible that some afferents run with the vagal fibres, and this may explain the nausea and vomiting that may accompany renal pain ***(Snyder et al.,1992).***

Development of the kidney:

The definitive or metanephric kidney in man has its beginning in the second month of gestation. It is formed from two different mesodermal structures, ureteric bud and metanephric blastema ***(Petersen, 1986).***