

RADIOLOGICAL AND IMAGING DIAGNOSIS
OF NEUROBLASTOMA

A THESIS

*Submitted For Partial Fulfilment Of The
Master Degree In Radiodiagnosis*

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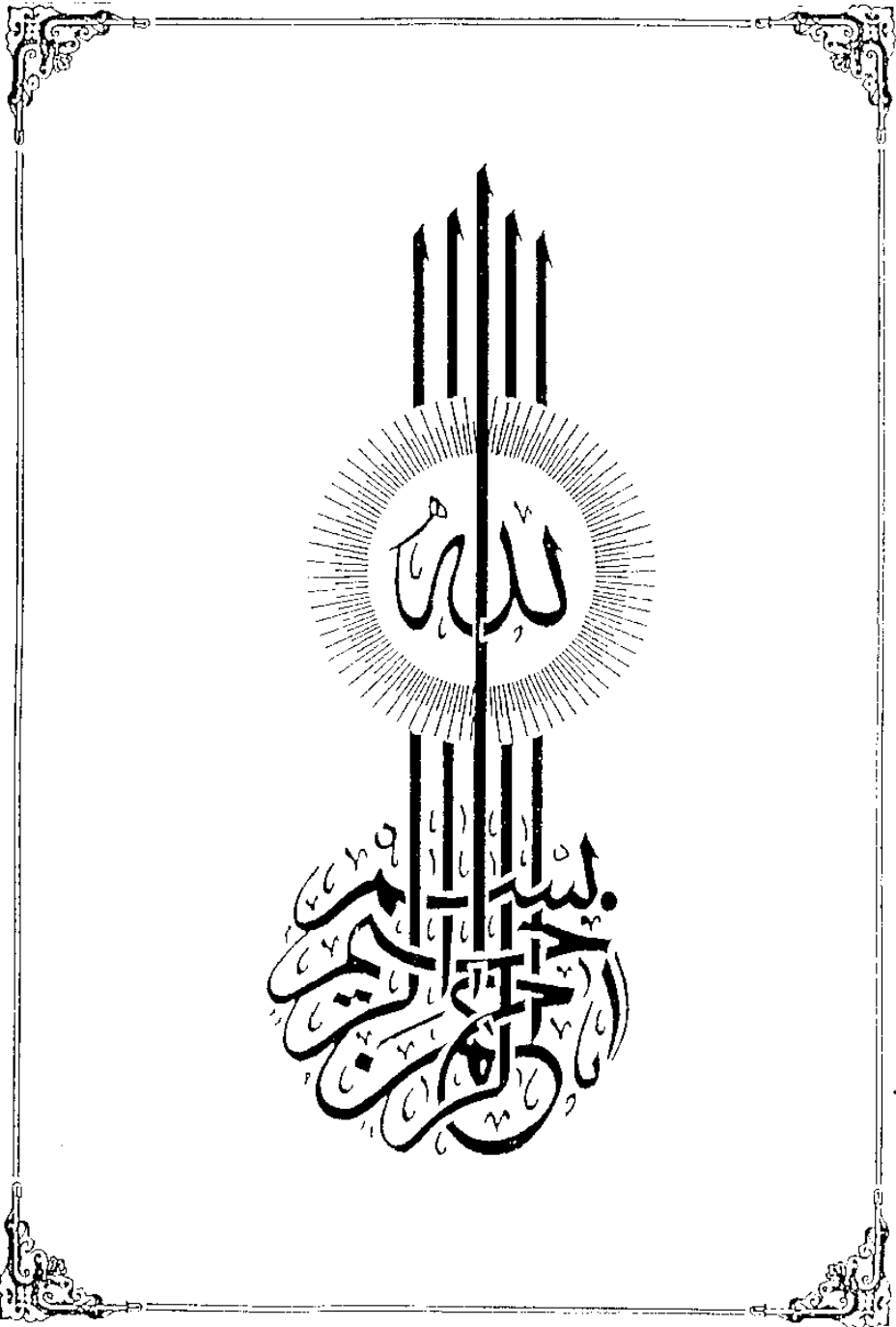
AIN SHAMS UNIVERSITY



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TO SOHA AND HANDY

By the time that they are old enough to understand this it will be archaic, but that is what will make the world a better place to live in.



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**INTRODUCTION
AND
AIM OF WORK**

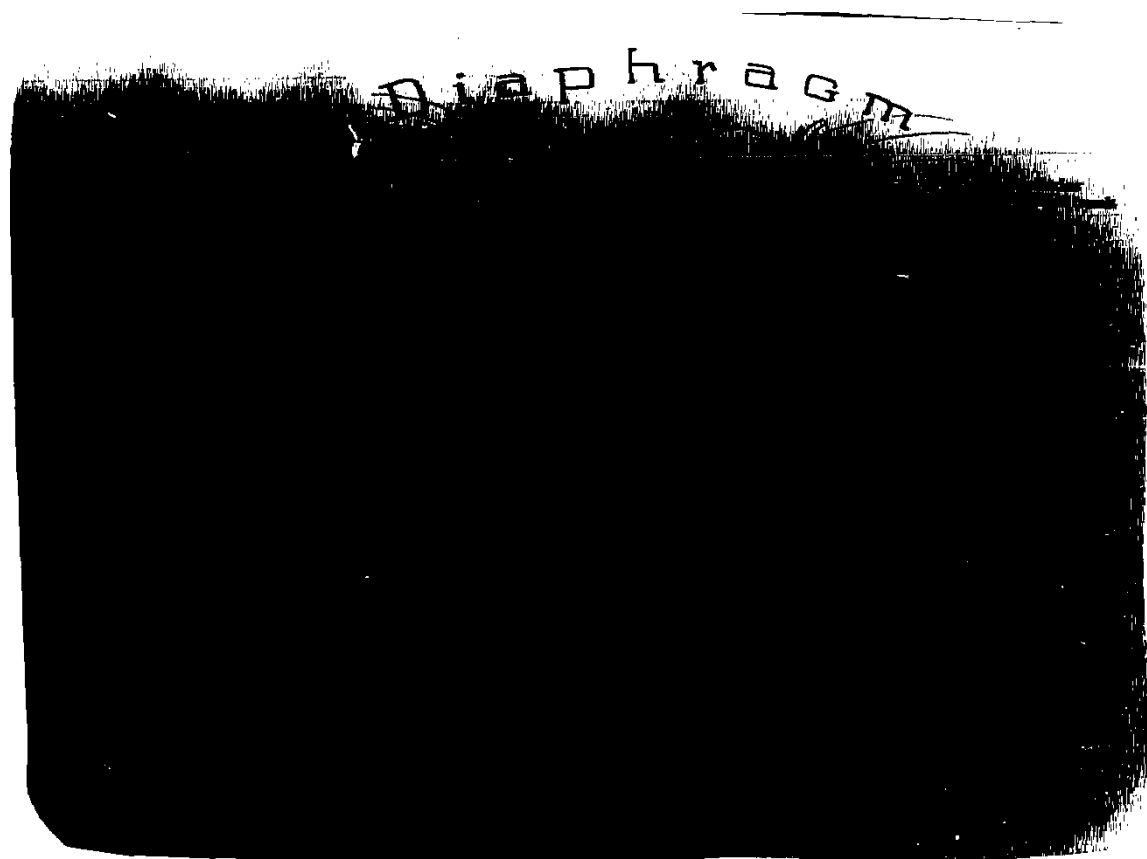
INTRODUCTION AND AIM OF WORK

Neuroblastomas are the most common malignant tumours in infancy and childhood. They arise from the neural crest cells that normally give rise to the adrenal medulla and sympathetic ganglia, they most commonly affect children between the ages of 6 months to 3 years, but can occur at or just after birth so it is considered truly an embryonic tumour. The overall survival rate is only 30% hence the disease in the majority of children is repeatedly evaluated for early diagnosis and treatment of recurrence and distant metastases.

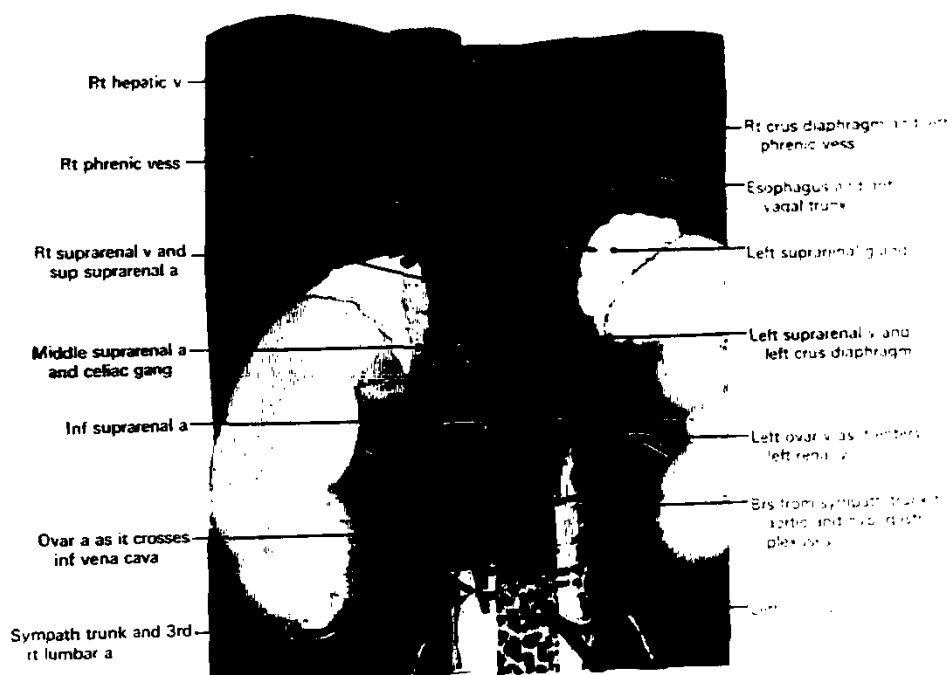
Two thirds of the patients have metastases when seen by chance for the first time and frequently the symptoms and signs arising from the secondary spread attract the attention of the physician. A patient with metastatic neuroblastoma often appears chronically ill, being pale, and irritable and a mass frequently is found by chance. The common presenting signs are an abdominal mass, fever, proptosis and orbital ecchymosis, enlarged nodes also may be present.

In the past years the diagnosis of this lesion depended mainly on radiography of the abdomen and perirenal air insufflation supplemented by urinary assays for catecholamines.

BASIC ANATOMY



(Fig. 1): Coeliac trunk, Ganglia, And the suprarenal glands.
(After Grant, 1975).



(Fig. 2): Diagrammatic illustration for anatomy and relations of the suprarenal glands.

(After Walmsley, & Murphy, 1976).

surfaces, but the right gland has an antero-medial surface.

The right suprarenal gland: (Fig. 1,2) is situated posterior to the inferior vena cava and the right lobe of the liver, and anterior to the diaphragm and upper pole of the right kidney. The base is in contact with medial and anterior surfaces of the upper pole of the right kidney. The hilus is situated little inferior to the apex and near to the anterior border of the gland where the suprarenal vein emerges to join the inferior vena cava. The anterior surface faces a little laterally and has a medial, narrow, vertical area not covered by a peritoneum, and posterior to the inferior vena cava, and has a lateral area in contact with the liver. The posterior surface is related above to the diaphragm and below to the upper pole and adjacent part of the anterior surface of the right kidney.

The left suprarenal gland: (Fig. 1,2) is crescentic, its concavity covers the medial border of the left kidney above the hilum, its medial aspect is convex, while its lateral aspect is concave. The anterior surface is covered superiorly by peritoneum which separate it from the cardiac end of the stomach, forming a part of the stomach

bed, inferiorly the anterior surface is not covered by peritoneum and is related to the tail of the pancreas, and splenic artery. The hilus is near to the lower border of the anterior surface, from which the suprarenal vein emerges to join the left renal vein. The posterior surface joins the left kidney laterally while it is in contact with the left crus of the diaphragm medially. The convex medial border is related to the left coeliac ganglion, left inferior phrenic artery and left gastric artery (Last, 1978). The adrenals are not like the kidneys, are firmly fixed at their apices, so in erect position there is tendency for the renal structures to be separated from the suprarenal glands. In infancy, the adrenal glands are relatively large, the foetal cortex is particularly large in proportion to the rest of the gland, during the prenatal life, beginning with approximately the seventh month, the cortex is gradually diminished in size proportionately to the age of two years, when its relationship to the medulla is stabilized and remains relatively constant there-after. The decrease in the weight of the gland is rapid during the first months of extrauterine life, but it slows down after this period. After the first postnatal year the gland enlarges in size slowly and continues to grow progressively until puberty with a final weight 5gm



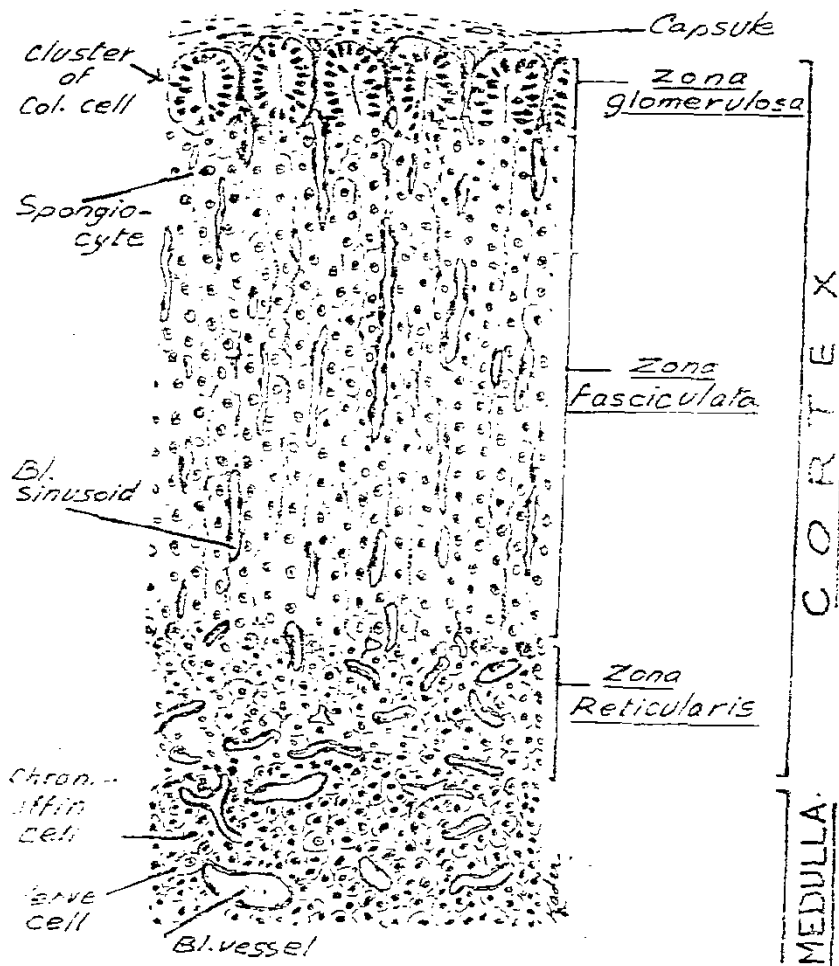
The female suprarenal gland usually slightly larger than that of the male. The left gland is usually slightly larger than the right. (Meschan 1976).

BLOOD SUPPLY OF THE SUPRARENAL GLANDS:

1. Arterial supply: The adrenal gland have an abundant arterial supply via: (a) the superior suprarenal artery which arise from the inferior phrenic artery, (b) the middle suprarenal artery which arises from the aorta opposite the superior mesenteric artery, and (c) the inferior suprarenal artery which arises from the renal artery, in addition branches from the ovarian and internal spermatic arteries, on the left side and from intercostal bilaterally are found in many patients. (Diagram 1). (Kahn, & Nickrosz, 1967).

2. Venous drainage: Both glands drain by a single large central vein which emerges from the hilus, the right joins the inferior vena cava, while the left joins the left renal vein behind the body of the pancreas. (Last, 1978, and Snell, 1981).

LYMPH DRAINAGE: Numerous lymph pass from the suprarenal glands to end in the lateral aortic lymph nodes (Snell, 1981).



(Fig.3): Section of the suprarenal gland.

(After Abdelkader, 1971).

NERVE SUPPLY: There is no evidence that the cells of the cortex receive any nerve supply. The medulla receives many nerve fibres which are mainly myelinated preganglionic sympathetic fibres reaching the glands through the splanchnic nerves. These nerves then form the suprarenal plexuses and connect with the renal and coeliac plexuses and coeliac ganglia (Sabiston, 1977, and Snell, 1981).

MICRONATOMY OF SUPRARENAL GLANDS:

- (1) **BY THE NACKED EYE** appearance of a fresh adrenal the cortex is thick, firm and has a yellowish color due to its high content of lipoids, while medulla is smaller, softer, and has a pink color due to its high vasculature. Each gland consists of stroma formed of a thick fibrous capsule which send trabeculae or septa into the gland, and parenchyma which divided into cortex and medulla.
- (2) **BY MICROSCOPIC** examination the cortex is formed of three layers: (Fig. 3).
 1. **Zona glomerulosa:** a narrow zone under the capsule formed of oval or rounded groups of columnar cells (Glomeruli), the nuclei of these cells are small, oval and deeply stained, the cytoplasm is basophilic and contain a lipid droplets.