SOLITARY THYROID NODULE

THESIS

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GENERAL SURGERY

BY

Mohamed Alaa Eldin A. Osman

M.B.B.Ch.

Ain Shams University

SUPERVISED BY

Dr. Samir Abou Zeid

Prof. of General Surgery

Dr. Adly Farid

Prof. of Pathology

Faculty of Medicine

Ain Shams University

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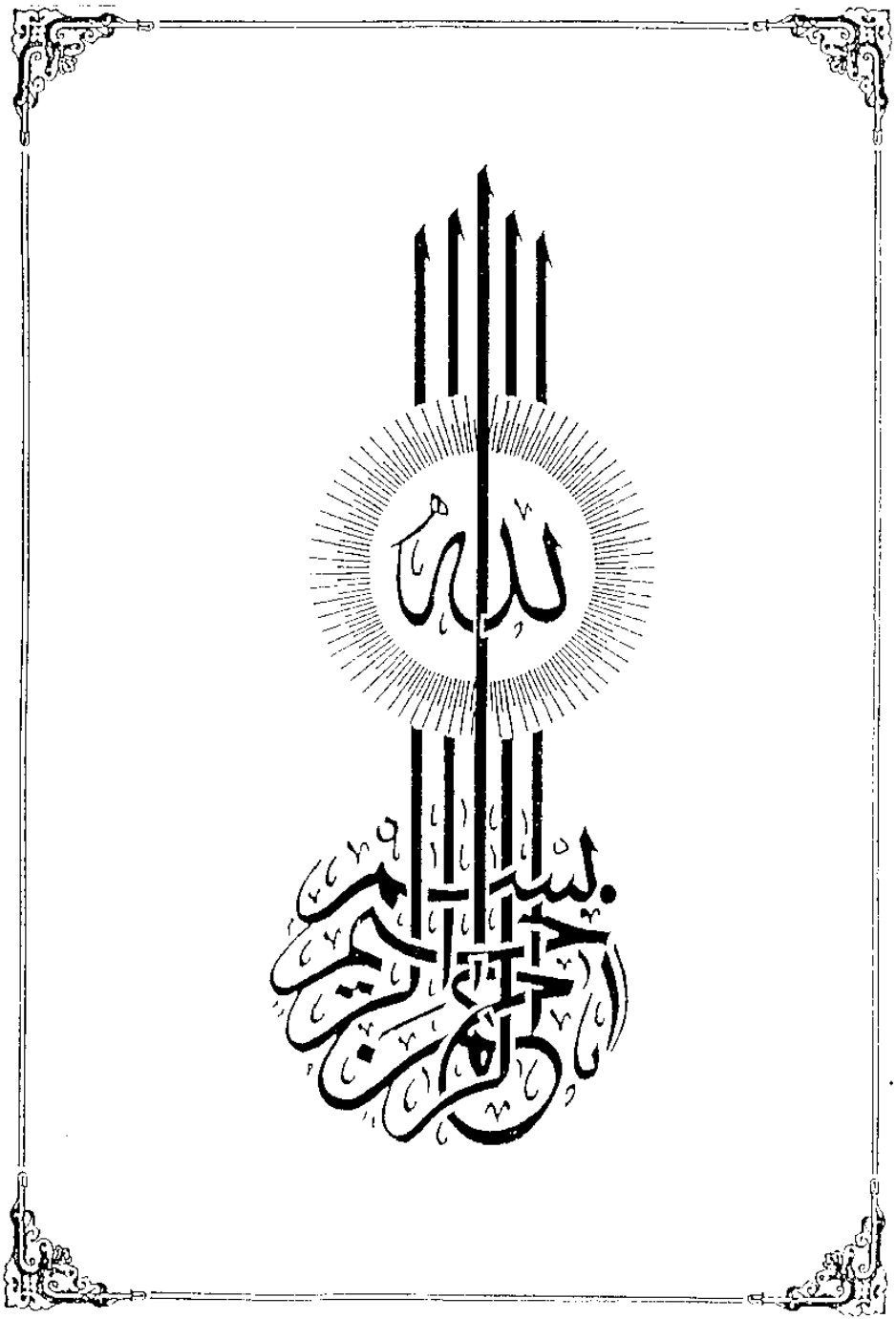

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INTRODUCTION

INTRODUCTION

The clinically solitary nodule of the thyroid gland constitues a special interest to both physicians and surgeons responsible for the clinical management of patients with thyroid diseases. This interest arises from the now well-documented risk of malignancy in such cases.

Until a method is available to allow accurate differntiation of nodular lesion of the thyroid gland, to perephrase. Sir Winston Churchill " They shall remain a riddle wrapped in a mystery inside an enigma".

This work aims to assess the relation between the clinical presentation of such nodule and subsequent operative and histo-pathological findings.

REVIEW OF LITERATURE

ANATOMY OF THE THYROID GLAND

I - Developmental Anatomy

Mesodermal condensations (pharyngeal arches) form the side walls of the primitive pharynx and grow ventrally to fuse in the midline. In this way a series of horse-shoe arches come to support the pharynx. These pharyngeal arches are seperated from each other at the side of the pharynx by pouches. The thyroglossal duct is formed by a process of evagination from the foramen caecum ventrally between the first and second arches, then caudally in front of the remaining arches as far back as the commencement of the trachea. It has an intimate relation to the hyoid bone. Remnants of the thyroglossal duct may persist giving rise to cysts (Last, 1977).

The bilobed thyroid gland grows out from the distal extremity of the thyroglossal duct, a portion of the latter often remains as the pyramidal lobe. The lateral lobes of the thyroid are firmly attached to the fourth pharyngeal pouch from which probably a part of the thyroid gland develops. There is evidence that calcitonin producing cells (C-cells in between the thyroid follicles) may develop from that part too and even the fifth pouch (ultimobranchial body) (Last, 1977).

II- Gross Anatomy

The thyroid gland consists of two symmetrical lobes united in front of the second, third and fourth tracheal rings by an isthmus of gland tissue. Superficially, it is covered by the sternothyroid and sternohyoid muscles, more superficially by the superior belly of the omohyoid muscle overlapped below by the anterior border of the sternomastoid muscle. The medial surface is moulded over the larynx and trachea, above, it is in contact with the inferior constrictor of the pharynx and posterior part of the cricothyroid muscle. Below, it is related to the side of the trachea in front, to the oesophagus behind and the recurrent laryngeal nerve in between. The postero-lateral surface is related to the carotid sheath and overlaps the common carotid artery. The posterior border is closely related below to the inferior thyroid artery and the posterior branch of the superior thyroid artery. In addition the parathyroid glands are usually related to this broder. The lower end of the posterior border of the left lobe is closely related to the thoracic duct(Gray's ,1969).

The gland possesses its own delicate histological capsule, the fascia propria. It lies free within an envelop of pre-tracheal fascia, a fact that explain the movement of the trachea with deglutition. A small portion of the gland often projects

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from the isthmus commonly to the left side, named the pyramidal lobe. It is attached to the inferior border of the hyoid bone by a fibromuscular band, when muscular it is termed the levator glandulae thyroidae (Last, 1977).

Arterial Supply :

The thyroid gland is supplied mainly by the inferior and superior thyroid arteries and other accessory branches.

The superior thyroid artery is the first branch of the external carotid artery, it piecres the pretracheal fascia to reach the summit of the upper pole. It divides into anterior and posterior branches.

The inferior thyroid artery arises from the thyrocervical trunk of the first part of the subclavian artery. It divides outside the pretracheal fascia into four or five branches that pierce the fascia separately to reach the lower pole of the gland.

The thyroidae ima artery arises from the brachicocephalic trunk or directly from the arch of the aorta, in 3 per cent of individuals (Last 1977).

Accessory thyroid arteries arises from the oesophageal and tracheal vesseles (Duplessis, 1977).

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Veinous Drainage :

The thyroid gland is drained by a system of veins. These are the superior thyroid vein, the middle thyroid vein and the inferior thyroid veins.

The superior thyroid vein arises from the upper pole, following its artery. It ends in either the internal jugular or the common fascial vein. The middle thyroid vein is short and wide, it passes from the middle of the lobe directly to the internal jugular vein, crossing the common carotid. The inferior thyroid veins arise from the isthmus and the lower poles of the gland, to form a plexus in the pretracheal fascia. This plexus drains into the brachiocephalic veins, mostly to the left side (Last, 1977).

The Lymph Drainage :

There is an extensive lymphatic network within the gland Although some lymph channels pass directly to the deep cervical nodes, the subcapsular plexus drains principally to the juxta-thyroid nodes i.e. pretracheal (Delphic) and the paratracheal nodes and nodes on the superior and inferior thyroid vein and thence to the deep cervical and mediastinal group of nodes (Baily & Love's, 1977) .

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Nerve Supply of the gland:

It is supplied by sympathetic nerves derived mainly from the middle cervical ganglia and enter the gland on the inferior thyroid artery. Vagal fibres can be traced to the gland, their function is unknown (Last,1977).

Nerves related to the gland :

The recurrent laryngeal nerve lies in the tracheo-oesophageal groove, posterior to the inferior thyroid artery. It may be further anterior or even entwined with the branches of the inferior thyroid artery.

The non-recurrent laryngeal nerve on the right side, that replaces the recurrent laryngeal nerve when occasionally the right subclavian artery arises directly from the aorta, may be mistaken for the inferior thyroid artery or the middle thyroid vein.

The external laryngeal nerve lies close to the superior thyroid vesseles, usually outside the false capsule, and can therefore be seperated from the vesseles, while the internal laryngeal nerve penetrate the thyrohyoid membrance to the larynx (Du Plessis, 1975).

III - Microscopic Anatomy :

The gland consists of follicles, whose appearance depends on the state of the activity of the gland. In the resting state the follicles are uniformly distended with structureless colloid, they are rounded in outline and lined with a well stained layer of low columnar eiptheluim. A small rounded cells called the parafollicles cells or C-cells lie between the follicles. They produce calcitonin. In the more active state the amount of the colloid is less and the follicles are uniformly smaller and crinkled in outline. The lining columnar epitheluim is much taller (Last, 1977).

PHYSIOLOGY OF THE THYROID GLAND

The primary function of the thyroid gland is the production of thyroid hormone for regulation of body metabolism. Exogenous iodine is essential for the formation of thyroxine. Iodide is activety trapped by the acinar cells of the thyroid where it is first changed into an active form. The iodine next combines with tyrosine to form mono- and di-iodotyrosine. These then combine together to form tri-iodothyronine (T3) and tetraiodo-thyronine (T4) or thyroxine which are stored within the follicles in combination with a globulin forming thyroglobulin. According to the needs of the body the hormone is then released from the gland and circulates in the blood, bounded to plasma protein which are Albumin, a prealbumin called thyroxine binding preablumin (T.B.P.A.) and @ gloublin (Ganong, 1977).

The thyroid gland is regulated by the pituitary gland through the thyroid stimulating hormone by a feed-back mechanism. The phypothalamus secretes thyrotopic releasing factor which stimulates the release of thyroid stimulating hormone (Current, 1977).

PATHOLOGY OF THE SOLIRTRY THYROID NODULE

John et al, 1972 stated in their review (the variable nature of the thyroid nodule) that the thyroid nodule has been a source of controversy for many years. The therapeutic problem swings from an ultraradical approach that seeks the removal of all nodules, to an ultraconservative approach that favors treating all nodules by one modality. Both of these approaches fail to take into consideration the variable nature of the thyroid nodule. The gererally expressed reason for advocating removal of all nodular lesions of the thyroid gland has been the fear of malignancy because the nature of these nodules can not be determined pre-operatively with any degree of certainty. There is no other alternative possible way of differentiation of nodular lesion uptil now other than microscopy.

Most of the review of the literature showed that 12.3 per cent (Bhagabati et al, 1971) to 50 per cent (Taylor, 1969) of clinically solitary nodule of the thyroid were multinodular goiter, whereas others comprised different pathology.

There is now well-documented risk of malignancy in solitry nodule of the thyroid. (Pearras et al, 1972).

John et al, 1972 showed that in a series of 1130 patients undergoing operation for thyroid nodules at Scott and White Memorial Hospita, primary carcinoma of the thyroid was found in 15.6 per cent of patients with solitary nodule. They said that