ULTRASOUND ECHOGRAPHY OF DISEASES OF THE THYROID GLAND

Thesis Submitted In Partial Fulfilment Of The Requirements For The Doctor Degree In General Surgery

BY

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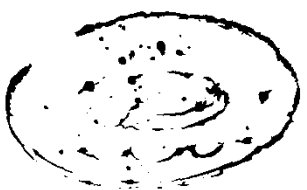

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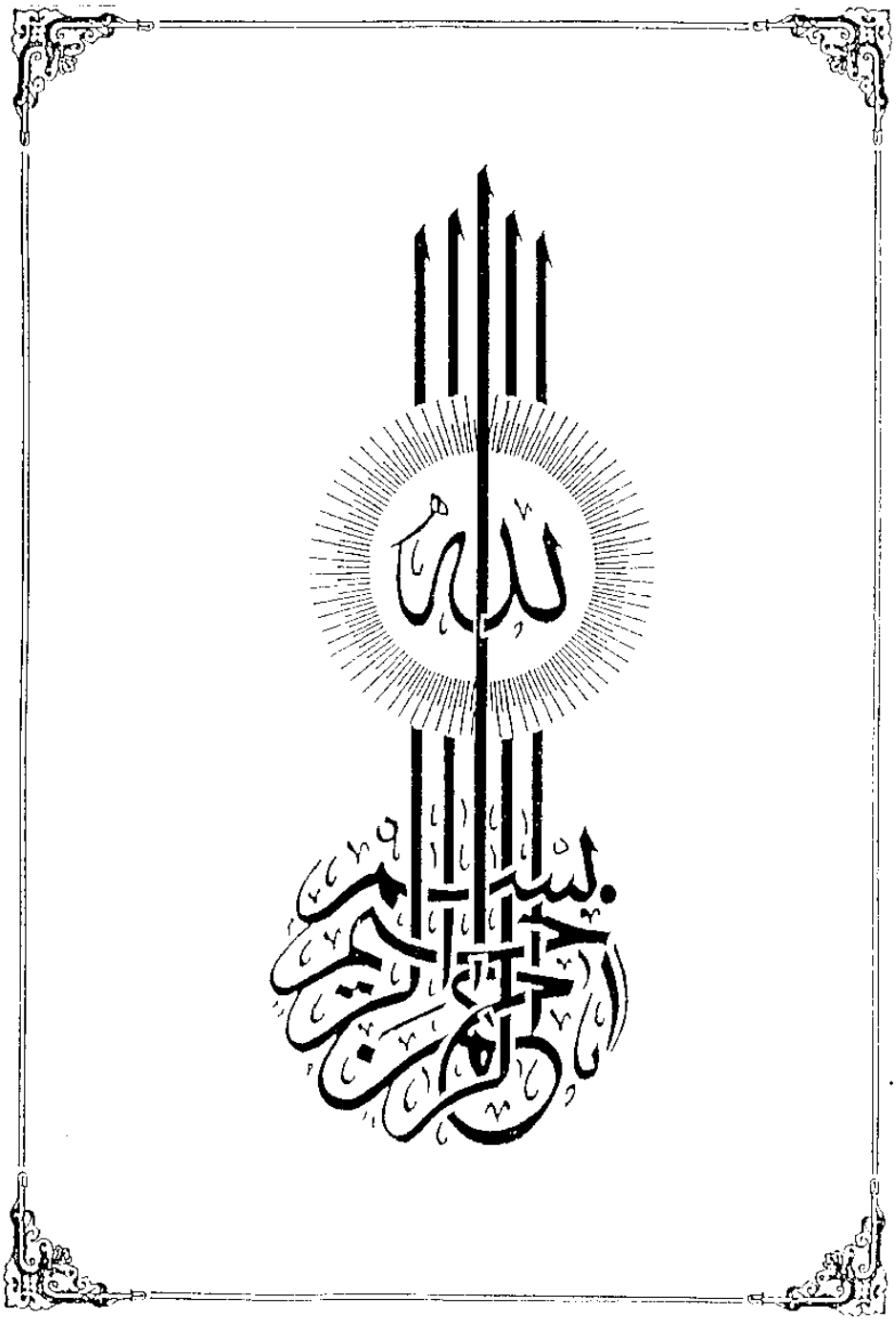

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CONTENTS

AIM OF THE WORK

INTRODUCTION

Localized or diffuse enlargement of thyroid gland is a common surgical problem . Every available investigation should be made use of to reach a correct diagnosis .

Ultrasonography as a diagnostic procedure has an increasing application in all fields of medical science because it is a safe, simple, inexpensive , non-invasive procedure and contrast agents are not needed and the diagnostic information is obtained without discomfort or morbidity .

In the past few years, specific instruments known as small parts scanners have been developed to examine the first 4 or 5 cm below the skin . These instruments are designed to look at superficial organs or vessels in which very high resolution is critical such as the thyroid .

The various methods used for the investigation of the thyroid gland are mainly for its functional activity and in many cases ; the resulting informations obtained are insufficient to establish a confident diagnosis of the underlying thyroid disease .

The object of our study is to evaluate the use of "high resolution" , "high frequency " scanners, in the interpretation of various thyroid disorders, as well as,

its role as a recent imaging tool in the diagnosis and follow up of thyroid gland diseases.

A comparison between our results, clinical data, laboratory findings, post_operative pathologic examination and other modalities used ; is discussed .

REVIEW OF LITERATURE

REVIEW OF LITERATURE

HISTORICAL ASPECTS

Goiter , or an enlarged thyroid gland , has been a recognized disease for several years (Ross G., 1978) .

The thyroid gland, previously referred to as the "laryngeal " gland , was so named by Wharton in 1946 because of either its own shield like (thyreos , shield)shape or the shape of the thyroid cartilage ,with which it is closely associated.

Classic descriptions of hyperthyroidism ,or exophthalmic goiter ,were presented by Parry(1825), Graves (1835) ,and Von Basedow(1840) ,and hypothyroidism ,or myxedema ,was described by Curling (1850) and Gull (1875) .Schifl ,in the middle of the nineteenth century , conducted experiments demonstrating the importance of the thyroid (Kaplan , 1989) .

In 1882 ,Reverdin produced experimental myxedema by total or partial thyroidectomy . In the 1890s ,Murray and Howitz successfully treated myxedema with thyroid extract (Kaplan E. L. 1989) .

The first operations on the thyroid were primarily for simple goiter ,and much experience was gained that later proved of importance in the surgical management of hyperthyroidism .

Until the introduction of antithyroid drugs in the 1940s ,partial thyroidectomy for toxic goiter was

practiced widely but not always with gratifying results . Thyroid surgery today is for neoplastic disease and multinodular goiter and ,in selected cases , for the permanent control of hyperthyroidism .

The first successful thyroidectomy on record appears to have been performed about A.D. 952 in Zabra , an Arab City of Spain , by a Moorish physician , Albucasis , who was well known throughout the Moslem world of his time . He recorded many of his medical ideas in his subsequently famous book Al-Tasrif , which was translated into Latin,French and Hebrew and is today regarded as one of the treasures of medical history emanating from the Arab World .Albucasis is thought to have been the first to introduce many surgical innovations (Harrison .,1986).

Although Billroth and his group successfully performed a number of thyroidectomies in the 1860s and thereafter, it is Theodor Kocher who is regarded as the father of thyroid surgery

He performed this operation in the later 1800 over 2000 times with only a 4.5 per cent mortality .He also described "cachexia strumipriva",i.e.,Myxedema, which he noted as a sequel in 30 of his first 100 thyroidectomies (Kaplan ., 1989).

Theodor Kocher, was the primary force that moved thyroid surgery forward . He advocated gentle, meticulous surgery that spared the yet to be discovered

parathyroid glands and anatomical appreciation of the recurrent laryngeal nerve .With application of these principles , the surgical mortality decreased from more than 50 per cent to approximately o.2 per cent .Even more important was the discovery by Kocher that total thyroidectomy was followed by the development of myxedema , and he demonstrated that this distressing complication could be prevented by subtotal thyroidectomy .

Halsted undertook considerable historical research on thyroid surgery and evolved his own method of thyroidectomy .He described this work in a monograph of superb dimensions ," the operative story of goitre " which to this day remains a model of surgical scholarship of highest quality .

The first successful transplantation of thyroid was reported by Payer in 1906 , who transplanted a portion of the gland from a women into the spleen of a myxedematous daughter with " successful" results (Kaplan ., 1989) .

Isolation of the hormone thyroxine (T4) was accomplished by Kendall in 1914 (Kaplan ., 1989) , and its synthesis was accomplished by Harrington and Barger in 1927 (Harrison T. S., 1986) .

In 1953 , the important discovery of 3,5,3 tri-iodothyronine was made by Gross and Pitt-Rivers and by Roche, Lissitsky ,and Michel almost simultaneously . This compound proved to be more potent in a variety of

its effects than thyroxine itself .

Of particular importance to safe thyroid surgery was the advent of effective antithyroid drugs . Thiouracil was introduced in 1943 by the Mackenzies and Astwood et.al .with these drugs ' ,safe surgical control of thyrotoxicosis became a reality , and this advance removed the remaining acute threat inherent in the surgery of the thyroid gland (Harrison ., 1986).

ANATOMY

A: DEVELOPMENTAL ANATOMY

The thyroid is embryologically an off shoot of the primitive alimentary tract , from which it later becomes separated (Kaplan .,1989).

Embryologically , the thyroid appears in about the third week , when the embryo is only 3.5 to 4.0 mm. long . It begins as a proliferation of epithelial cells in the floor of the developing pharynx at a point indicated by the foramen caecum , a dimple like depression at the base of the tongue (Harrison ., 1986) .

The thyroid gland is a median endodermal thickening caudally to the tuberculum impar which invaginates and form a bilobed structure . It migrates caudally in the mid line , ventral to the aortic sac and laryngotracheal tube to reach its definitive position . Here it associates with the caudal pharyngeal complexes, which may possibly contribute to the gland (Williams , 1981) .

More recently , other workers Polizer, 1955, have also , suggested that the thyroid is of multiple origins and receives a significant contribution to its lateral lobe from the ventral component of the fourth pouch . The evidence for such a dual origin ,however , is not entirely convincing, though the fourth pouch fuses with the expanding lateral lobes of the median thyroid primordium (Boyd, 1964) .

The ultimo-branchial body which arises from a diverticulum of the fourth pharyngeal pouch of each side amalgamates with the corresponding lateral lobe . Parafollicular cells (C-cells) are derived from the neural crest and reach the thyroid via the ultimo-branchial body .Recently, consideration has been given to the possibility that some C-cells are of endodermal rather than neural crest origin . It is doubtful whether the branchial apparatus itself cotributes to the thyroid follicular cells (Rains and Mann ,1988).

Present evidence suggests that the primary origin of the calcitonin-producing cells of the thyroid gland is the neural crest of the embryo . From the neural crest these cells migrate to the ultimo-brancheal body (Prarse and Polak, 1971), and later become part of the thyroid gland . C-cells belong to a group of neural crest derivatives known as APUD cells , the acronym comping from amine precursor uptake and decarboxylation (Skandalakis, et.al., 1983) . FIG. 1.

ABNORMAL DEVELOPMENT

*LINGUAL THYROID :

Occasionally , the thyroid gland is not in the normal cervical position , but lies beneath the epithelium of the tongue at the site of the foramen caecum , such a lingual thyroid is not "undescended" but rather is abnormally ascended (Skanadalakis,