ROLE OF ULTRASONOGRAPHY IN DIAGNOSING PATIENTS WITH THYROID SWELLINGS

AN ESSAY

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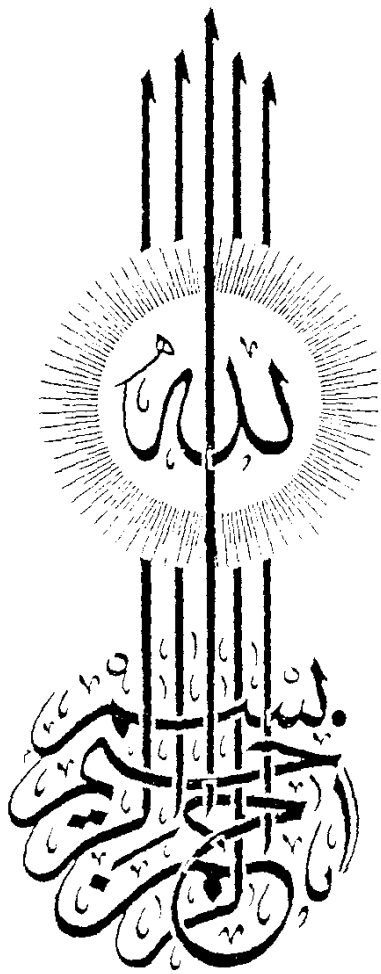

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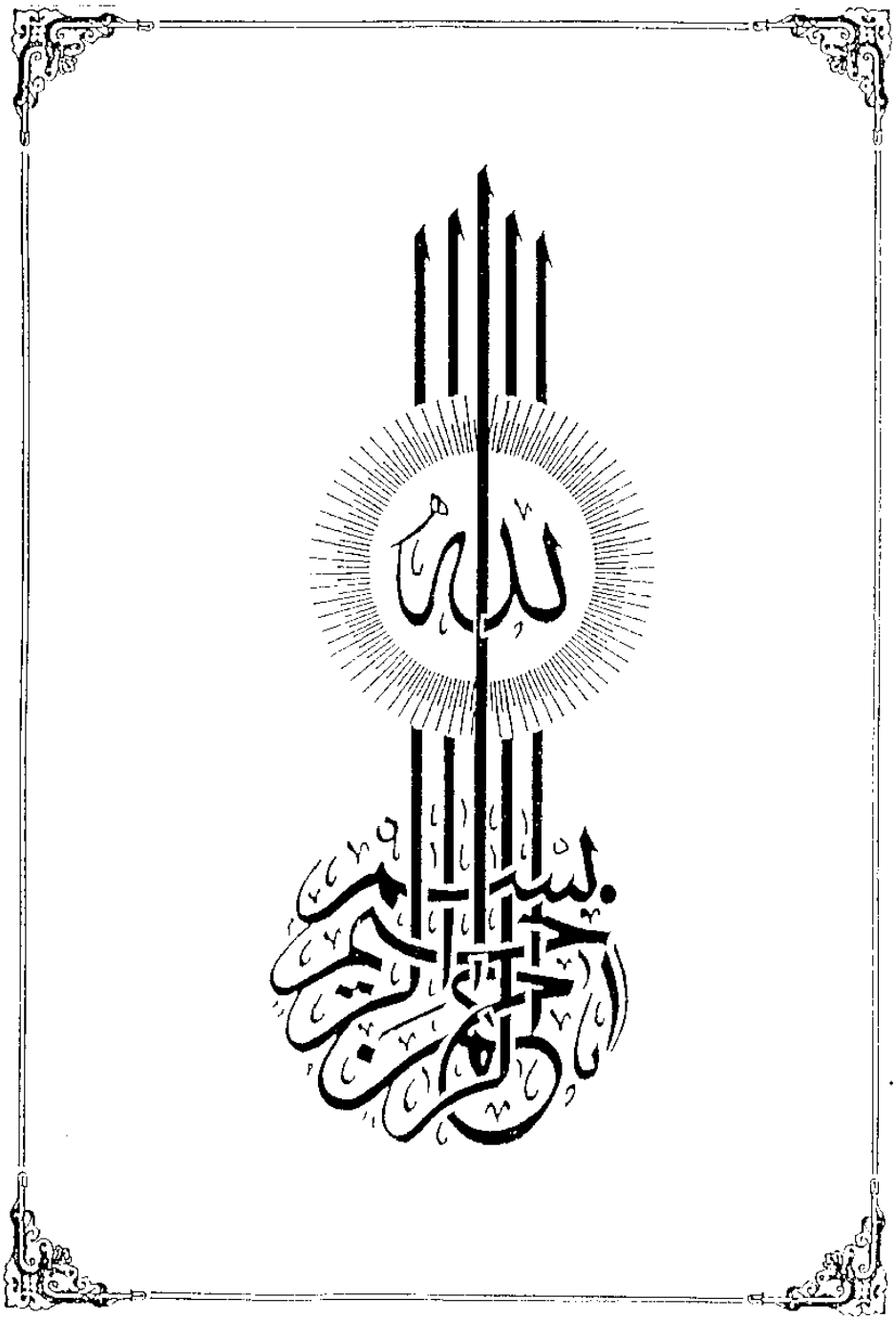

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INTRODUCTION

INTRODUCTION

Thyroid gland is one of the endocrine glands lying on the front and sides of the lower part of the neck.

Thyroid swellings are one of the common problems met with in daily surgical practice in Egypt, These swellings are so frequent that goitre is actually considered an endemic disease.

The diagnosis of thyroid swellings can not be easily determined on clinical grounds only . Certain investigations directed either to the state of thyroid function or structure must be done such as thyroid function tests, radioactive scanning, thyroid antibodies, thyroid angiography, lymphography etc.

Ultrasonography is a safe, reliable, inexpensive diagnostic technique that can be applied to a variety of clinical situations.

Thyroid ultrasonography is now becoming one of the standardised investigations for thyroid swellings.

The proved safety of ultrasound and its non-invasive nature have made this modality more often, the diagnostic procedure of choice as it gives a clear overall cross-sectional view of the thyroid which can show the site and depth of lesion up to 2 mm in diameter with early applications, the main emphasis has been on the differentiation between solid and cystic lesion. However, the recent use of grey scale high-resolution sonography will permit the reliable differentiation of benign and malignant masses.

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REVIEW OF LITERATURE

HISTORICAL REVIEW

The first attempts at locating submerged objects with ultrasound probably came after the sinking of the titanic in 1912. During the world war I Langevin and associates sought to utilize ultrasound for the detection of submarines improved technicology led to the development and wide spread military and civilian use of sonar.attempts were made to apply ultrasound to medical diagnosis just prior to the second world war.

Dussik attempted the first application of ultrasound to medical diagnosis, he tried to visualize the cerebral ventricles by measuring attenuation of ultrasound beam transmitted through the head.

Utilizing avialable industrial and war surplus equipment several investigators began simultaneously to explore the medical application of reflected ultrasound and to design the ultrasound instrument especially for medical diagnosis.

Douglas Howry [1956] is credited with being one of the pioneers of diagnostic ultrasound. He developed the principle of compound scanning to

improve image quality.

John Wild [1956], is credited with demonstrating that ultrasound could detect differences between normal tissue, bengin tumour and cancer. He reported 90% accuracy in the diagnosis of bengin versus malignant lesions in 77 patients.

By the 1960's a series of studies on animals were carried out to verify the anatomic accuracy of ultrasonic pictures. The animals were scanned in water tanks while they were overdosed with anasthesia, their bodies were then frozen and comparable anatomic cross sections were obtained.

Ian [1958], is largely responsible for the development of contact scanning concept and for pioneering the extensive application of ultrasound imaging in obstetric and gynacology. He started these studies in 1954 and were directed to uterine fibromyomata and ovarian tumours.

While the first trial of displaying the cross-sectional tomograms of the neck by application of altrasound was reported by Holmes in 1957. Japanese investigators have been very active in applying the

diagnostic ultrasound method to the thyroid gland.

For instance, Fujimoto et al., 1967, and others have puplished many results.Interesting results were also reported there after Damascelle et al.,[1968], Thijs [1976], Rasmusen et al., [1973], Blum et al., [1972], Miskin et al.,[1973].

Howry [1957] developed water compound scanning system which was called sonoscope and sonogram and obtained very clear sonograms showing the cross sectional tomograms of the neck including the thyroid gland.

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ANATOMY OF THE THYROID GLAND

The thyroid gland is composed of two lateral lobes connected by an isthmus. The lobes measured about 5x2 5x2.5 cm. The isthmus measures about 3.7 x 1.2 cm. One lobe, usually the right, may be smaller than the left [7 percent]. The isthmus is absent in about 10 percent of thyroid glands, and the pyramidal lobe is absent in about 50 percent [Shandalakis et al., 1983].

A minute epithelial tube or fibrous cord, the thyroglossal duct, almost always extendes between the thyroid gland and the foramen cecum of the tongue. The thyroid gland normally extends from the level of the 5th cervical vertebra to that of the 1st thoracic vertebra. It may lie higher, [i.e. Lingual thyroid]. But rarely lower than normal [Falor et al.,1983]. A triangular projection of gland tissue called the pyramidal lobe extends upwards from the left side of the upper border of the isthmus and is connected to the hyoid bone above by a fibrous band or muscle slip [Levator glandulae thyroidae]. Each lateral lobe is roughly triangular on section. Its superficial surface is covered by the infrahyoid or ribbon muscles and the sternomastoid muscle overlaping. The medial surface is related to two tubes, oesophagus and trachea, two nerves, recurrent and external laryngeal, two

muscles, inferior constrictor and cricothyroid. The posterior surface overlaps the common carotid artery and covers the terminal part of the inferior thyroid artery.

BLOOD SUPPLY OF THE THYROID GLAND

The thyroid has an abundant blood supply with a normal flow rate of about 5 ml/gm per minute [Kaplan,1984].

ARTERIES

Two paired arteries, the superior and inferior thyroid arteries, and an inconstant midline vessel the thyroid ima artery supply the thyroid.

1. Superior thyroid artery :

Is a branch of the external carotid artery, it pass downward and anteriorly to reach the superior poles. It enters the gland superficially. At the superior poles, the arteries are divide into anterior and posterior branches. The anterior branch of one lobe anastomosis with the contralateral artery, the posterior branch anastomosis with branches of the inferior thyroid artery. From the posterior branch a small parathyroid artery passes to the superior parathyroid gland.

2. Inferior thyroid artery :

Is a branch of the thyrocervical trunk of the subclavian artery. It enters the gland from its posterior surface. Ascending behind the carotid artery and jugular vein, then passing medially and posteriorly on the anterior surface of longus colli muscles. After piercing the prevertebral fascia, the artery divide respectively into two or more branches as they cross the ascending recurrent laryngeal nerve. The nerve may pass anterior or posterior to the artery or between their branches. The lowest branch send twigs to the inferior parathyroid gland and supply the lower poles of the thyroid gland. The upper branch supply the posterior surface of the gland usually anastomosing with the descending branches of the superior thyroid artery. The inferior thyroid artery is absent in 3.5% of patients.

3. Thyroidea ima artery:

An occasional vessel from the aortic arch, when present it enters the lower part of the isthmus.

ACCESSORY THYROID ARTERIES

Small vessels to oesophagus and trachea send