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Diyala University
College of Medicine



**A review of Indications of Thyroid Surgery in Baquba
Teaching Hospital**

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By

Ahmad Rfaat Ali

M.B.C.H.B

Supervised by

Assis. Prof. Dr. Muqdad Fuad Abdul-Kareem

FICMS SURGERY

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University of Diyala

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CHAPTER

ONE

INTRODUCTION

1- Introduction

1-1 Anatomy of the thyroid gland

The thyroid gland is just a butterfly like structure lies anteriorly in the neck. It consist of two lobes which are connected to each other by an isthmus. **(Gray's Anatomy 2008).**

In the neck, the cricoid and the thyroid cartilage situated above the thyroid. The isthmus which also called the middle lobe cover the area from the second to the third rings of the pipe. The top of the lobes can reach the thyroid cartilage while the bottom encase the region fourth to the sixth rings. **(Elsevier's 2007)**

In an adult, the gland weight is 25 gram, with each single lobe about five centimeter long, two centimeter thick and three centimeter wide. Usually the thyroid gland is bigger in females with more increase in it's size during pregnancy. Anatomically the gland is said to be covered by a fibrous capsule which is thin in its inner layer, while it is thick in its outer one. The pretracheal fascia continue with the outer layer, and its main function is to attach the thyroid to the trachea and the cricoid cartilages by suspensory ligament named the Berry's ligament. It is this suspension of the thyroid to this pretracheal fascia through this ligament which make the gland move with swallowing.

Also the inner layer interdigitate inside the gland septating it's tissue to smaller microscopic lobules (**Gray's Anatomy 2008, Ellis, Harold 2005**)

The muscle which sit in front of the gland is called the infrahyoid muscle while the sternomastoid muscles lie on the sides. The carotid arteries lie posteriorly in relation to the outer wings of the gland. The structures which lie posterior to the thyroid are the larynx, trachea and the oesophagus. (**Ellis, Harold; 2005**)

The thyroid gland function to synthesize and secrete the thyroid hormones which have their main effects on the metabolic rate, synthesis of protein and development. Two hormones secreted by the gland, namely triiodothyronine and thyroxine, both of them formed from coupling of iodine with tyrosine. The thyroid gland also contain the parafollicular cells which secrete the hormone calcitonin which its main role is regulating serum calcium. (**Guyton & Hall 2011**)

1-2 Physiology of thyroid gland

The thyroid gland consist of follicles in which the thyroid hormones are produced through the process of tyrosine iodination within the thyroglobulin. (**Zimmermann MB 2009**)

The main stimulating hormone for the thyroid gland is the thyroid stimulating hormone (TSH) which is secreted by the

anterior hypophysis in response to negative feedback from decreasing circulating thyroid hormone. TSH act on TSH receptors on the cell membrane of the thyroid follicular cells to express its action. **(Chiamolera MI 2009)**

The TSH act through regulating the uptake of iodide through the receptors sodium iodide. This followed by number of steps which end with the production and release of thyroid hormones. **(Brent GA, Koenig RJ2010)**

The hormone which are secreted by the thyroid are both triiodothyronine (T3) and thyroxin (T4). Also peripherally T4 can be deiodinated to form T3. Triiodothyronine is physiologically more active than thyroxin. Within the thyroid follicular cells, both of the two hormones bounded to thyroglobulin which the later found within the colloid. The process of synthesis of the complex thyroglobulin is under control of many enzymes in several successive steps. **(Ganong WF 2005)**

The steps of thyroid hormones synthesis are as follow: trapping from the blood of inorganic iodide, then this iodide oxidized, which the later bound to tyrosine forming iodotyrosine. Monoiodotyrosin and diiodotyrosine are coupled to form T3 and T4. **(Cheng SY 2010)**

Thyroid hormones are necessary for the growth, development, regulation of metabolism and differentiation of the embryonic

neural tube. Deficiency of thyroid hormones produce abnormalities in these actions producing retardation of growth. **(Brent GA, Davies TF 2012)**

When thyroid hormones are needed, thyroglobulin complex is resorbed from the colloid and is broken down to release triiodothyronine and thyroxine which both liberated into the blood where they bound to serum albumin, prealbumin and globulin. The part of the hormone which is free is the one which is active biologically. Physiologically, T3 is more important as it act quickly within hours. On the contrast, T4 is slowly acting taking 4-14 days. **(Krukowski Z H 2004)**

Thyroid system

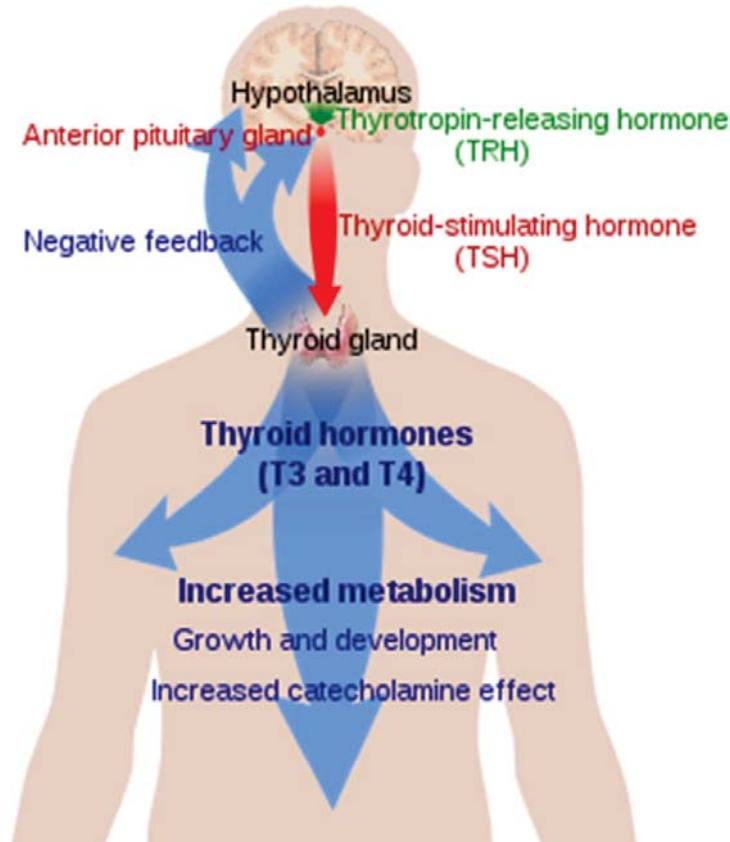


Figure 1 Thyroid system (C., Guyton, Arthur 2010)

1-3 Thyroid disease

The diseases affecting the thyroid gland either affecting the thyroid status or the size of the gland. Accordingly the symptoms will vary depending on the problem type, but generally there are five types: hyperthyroidism (increase thyroid function), hypothyroidism (decrease thyroid function), enlargement of the size of the gland without hyperthyroidism (simple goitre), inflammation of the gland and finally tumours affecting the thyroid gland. **(Bauer, DC 2013)**

Hyperthyroidism (thyrotoxicosis) is a thyroid status in which the thyroid gland synthesizes and secretes large amounts of thyroid hormones, producing symptoms such as irritability, loss of weight in spite of good appetite, tachycardia, diarrhea, hand tremor, intolerance to heat, excessive sweating and warm skin. **(American Thyroid Association 2016)**

Hyperthyroidism can present in many forms as diffuse Graves' disease, toxic multinodular goitre and toxic thyroid nodule. Sometimes Hashimoto's thyroiditis develops transient hyperthyroidism. **(Batcher EL 2007)**

Thyrotoxicosis is a term applied to a clinical condition which is resulting from increased action of thyroid hormone. Thyrotoxicosis can result from excessive synthesis of thyroid hormone followed by release of this hormone for which the hyperthyroidism term is applied. It can also result from destruction in the thyroid tissue causing unregulated excessive release of stored thyroid hormones without raised synthesis. **(Franklyn JA, Boelaert K., Bahn RS et al)**

Simple euthyroid goitre is defined as goitre that is not associated with malignancy or thyroid autoimmunity and is still regarded as a major challenge, both diagnostic and therapeutic. Simple goitres can be uninodular, multinodular or diffuse. When ultrasound is applied, most of these goitres show a nodular structure, especially in the older age group **(Knudsen N 2013)**. Simple

goitres are thought to be caused by an interaction in between genetic susceptibility and environmental stimulators; deficiency of iodine being the most important. There is no typical treatment for benign multinodular simple goitre (MNG), as reflected by lack of consensus in questionnaire surveys (**Bhagat MC et al. 2003, Diehl LA et al 2005**). Thyroid surgery is recommended if large goitre or malignancy cannot be excluded. However, it is well recognised that considerable number of patients refuse surgery, even when having large symptomatic goitre, which mandate the need for non-surgical substitute. These non-surgical options are: iodine supplementation, radioiodine (I 131) therapy and levothyroxine therapy. (**American Association of Clinical Endocrinologists 2006, Hegedus L et al 2003**)

Hypothyroidism is a thyroid status in which the thyroid gland synthesise and secret less than the normal requirement, producing symptoms as gaining weight, fatigueness, cold intolerance ,bradycardia, constipation, mood disturbance and dryness of the skin. (**American Thyroid Associatio 2012**)

Thyroiditis can be either Hahimoto's thyroiditis Dequervain thyroiditis or Riedel's thyroiditis. Enlargement of the thyroid gland could be benign or malignant. Goitre could be associated with hyperthyroidism, hypothyroidism or euthyroidism. Tumors of the thyroid could be benign or malignant. Benign as follicular adenoma; malignant tumours could be primary or secondary. Primary as papillary carcinoma, follicular carcinoma, medullary

carcinoma, anaplastic carcinoma. Metastatic carcinoma from other sites is rare. **(Vitti, Paolo; Latrofa 2013)**

1-4 Diagnosis of thyroid diseases

Diagnosis of thyroid disease achieved by doing thyroid function test (T3, T4, and TSH), ultrasound and fine needle aspiration cytology when mass present. These are routine investigations. Selective investigations include total serum protein, serum albumin, globulin and thyroid scan when toxicity present with nodule. Other investigations in selected cases include free T3 and free T4 and thyroid auto antibodies. **(Bailey & Love's short practice of surgery text book 2008)**

1-5 Management of thyroid diseases

Treatment of diseases affecting the thyroid vary depending on the type of disease. In general the treatment is either medical or surgical. The choice of type of treatment based upon many factors as the presence or absence of pressure symptoms, proved, suspicion or absence of malignancy and the thyroid status. **(Garber, Jeffrey 2012)**

In Graves' disease, the treatment options depend upon the age of the patient. Over 45 years, the treatment option is radioiodine. Under 45 years old, the treatment options depend on whether the goitre is small or large. If small, medical treatment or radioiodine. Medical treatment in the form of anti-thyroid drugs given for 18 months, then treatment stopped, if recurrence, then

surgery. In large Graves' disease, the treatment is surgical. Toxic multinodular goitre is usually treated surgically as it is usually large and associated with pressure symptoms and may enlarge further with the use of antithyroid medication. Toxic nodule is treated by surgery or radioiodine if the age of the patient is over 45 years. Radioiodine is becoming increasingly used even under 45 years age for those who completed their families. **(Bailey & Love's short practice of surgery text book)**

The extent of surgeries of the thyroid vary depending on the indication of the surgery extending from simple lumpectomy to total thyroidectomy. **(Ross, Douglas S 2016)**

Thyroid surgeries are common operations with extremely low rate of mortality, but it has its own specific morbidities which are definitely related to the expert of the surgeon. **(Harness JK 1986)**

1-6 Type of thyroid surgeries (extent)

The extent of thyroid surgeries vary from patient to another depending on the indication of operation. Lumpectomy involve removal of the lump only (rare): usually the whole lobe excised. Lobectomy involve total removal of one lobe plus excision of the isthmus. Subtotal thyroidectomy involve removal of both lobes and the isthmus leaving four gram of thyroid tissue on each side.

Near total thyroidectomy involve total lobectomy on one side and subtotal lobectomy on the other side and of course involve also removal of the isthmus. Total thyroidectomy involve bilateral total lobectomy with isthmusectomy. **(Mathur AK 2010)**

1-7 Indications of thyroid surgeries

The standard indications for thyroid surgeries; can be summarized as follow; Grave's disease for big goitre, toxic multinodular goitre, toxic thyroid nodule, euthyroid diffuse or multinodular goitre with pressure symptoms, failure of medical treatment, proved or suspected malignancy on fine needle aspiration cytology, and patient wishes. **(Edwin L. Kaplan 2012)**

1-8 Complications of thyroid surgery

As any other surgeries the thyroid surgeries are not devoid of complications and in fact some of these complications are serious. These complications could be recurrent laryngeal nerve injury, superior laryngeal nerve injury, intraoperative bleeding, postoperative haematoma formation both superficial and deep tension haematoma, hypoparathyroidism and wound infection.

Recurrent laryngeal nerve injury could be unilateral resulting in hoarseness of voice (usually) or acute suffocation, or bilateral injury resulting in laryngeal obstruction and could be surgical emergency which mandate emergency tracheostomy

Superior laryngeal nerve injury occurs during ligation of the superior pedicle, resulting in loss of high pitched sound.

Hypoparathyroidism with hypocalcaemia usually occurs during extensive surgeries as near-total and total thyroidectomy. The injury is usually ischaemic and in some cases due to removal of the four parathyroid glands. The risk of hypoparathyroidism should be only 1% and it is usually transient resolving in less than one year. **(Nomura K 1994)**

The incidence of intraoperative bleeding should be low in well prepared patient (euthyroid); the risk increase in recurrent cases and locally advanced malignancies. **(Dr. Gianlorenzo Dionigi 2006)**

The risk of postoperative haematoma formation increase with poor intraoperative techniques and the use of tube drain instead of redivac drain. Tension haematoma is very serious, can cause suffocation and can be fatal. The risk of is low as thyroid surgery is categorized as clean surgery and thrisk of infection should be less than 2%. Absorbable sutures should be used throughout the operation. **(Dr. Gianlorenzo Dionigi 2006)**

Aim of the study

This study aim to:

1. Evaluate the indications of thyroid surgeries in baquba teaching hospital and comparing them with standards
2. Highlight on the complications of thyroid surgeries