Prediction and management of hypo parathyrodism after Thyroidectomy for toxic goiter

Thesis
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بسم الله الرحمن الرحيم
﴿ وَأَنزَلَ اللَّهُ عَلَيْكَ الْكِتَابَ وَالْحِكْمَةَ وَعَلَّمَكَ مَا لَمْ تَكُن تَعْلَمُ وَكَانَ فَضْلُ اللَّهِ عَلَيْكَ عَظِيمًا ﴾
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Feisal Mahmoud Goda

To My

Father, Mother, Wife

and My

Children

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List of Abbreviations

ATC	: Anaplastic thyroid carcinoma
DIT	: Diiodotyrosine
EBSLN	: External branch of superior laryngeal nerve
FTC	: Foliicular thyroid carcinoma
IJV	: Internal jugular vein
LATS	: Long-acting thyroid stimulating antibody
MIT	: Monoiodotyrosine
PTC	: Papillary thyroid carcinoma
PTH	: Parathyroid hormone
RLN	: Recurrent laryngeal nerve
SLN	: superior laryngeal nerve
Tg	: Thyroglobulin
TMG	: Toxic multinodular goitre
TRH	: Thyroid releasing hormone
TSAB	: Thyroid stimulating antibodies
TSI	: Thyroid stimulating immunoglobulins

Introduction

The normal thyroid gland is impalpable. The term goiter (from the lattin gutter =the throat) is used to describe enlargement of the thyroid gland, it includes simple goiter (euthyroid), toxic goiter, neoplastic and inflammatory causes ***(Witte et al., 2004).***

Toxic goiter is a syndrome characterized by symptoms and signs of hyper metabolism and increased sympathetic nervous system activity that result from excessive thyroid hormone production. The most common cause of thyrotoxicosis is Graves' disease which account for 60% to 90% of all cases of thyrotoxicosis ***(Mittendrof and Mchenry, 2001).***

Classic thyrotoxic symptoms include; fatigue, weight loss, palpitations, and heat intolerance. The most common physical findings associated with hyperthyroidism are tachycardia and tremors ***(Ansaldo et al.,2000).***

Hyperthyroidism is easily confirmed by the presence of elevated serum levels of thyroxin (T4) or triiodothyronine (T3) and suppressed serum levels of thyroid stimulating hormone or antimicrosomal antithyroglobulin and antiperioxidase antibodies are often encountered. The 24 hours radioiodine (RAI) uptake is often elevated ***(Monzani et al., 1997).***

Treatment options for thyrotoxicosis include anti thyroid medications, radioactive iodine therapy, and thyroidectomy. Although

most hyperthyroid patients (especially those with Graves' disease) are treated medically, thyroidectomy has several distinct advantages including; rapid resolution, relative safety, high success rate, simultaneous tissue diagnosis, cosmetic improvement with goiter removal, ability to salvage medical failures, acceptable alternative for non-compliant patients and less risk of exacerbating ophthalmopathy ***(Tallsted et al., 2000).***

The extent of thyroidectomy depends on several factors. A total thyroidectomy is indicated in patients with a coexisting malignancy of the thyroid or parathyroid cancer, multiple endocrine neoplasia, severe opthalmopathy, or in patients unwilling to undergo reoperation or radioactive iodine therapy. A near- total thyroidectomy results when a total resection is intended, but the whole gland cannot be safely dissected from the surrounding nerves, so that a minute portion of thyroid is left near the nerve. Subtotal thyroidectomy is useful for the majority of patients. Factors associated with hypothyroidism after subtotal thyroidectomy are remnant size and autoimmune activity. If an euthyriod patient is the goal, some functioning thyroid tissue must be preserved a 4 to 7-gram remnant is the most appropriate size ***(Witte et al., 2004).***

Hypoparathyrodism after surgery may be temporary or permanent. It is most frequent with total thyroidectomy. Symptoms include peri-oral tingling and numbness, followed by similar sensations in the digits and a positive chvostek's sign, and may progress to

carpopedal spasm. Hypocalcemia increases anxiety frequently, respiratory alkalosis, hyperventilation, and tetany may occur . The incidence of permenant hypoparathyrodism after thyroid surgery is less than 2%. Transient postoperative hypocalemia occurs in up 50% of cases after thyroidectomy ***(Pattou et al., 1998).***

Although serial calcium levels correlate with development of symptomatic hypocalcemia, they may not be judged until 36 to 72 hours postoperatively.***(Lo CY et al., 2002).***

Immediate post-operative parathyroid assay result, available within 15 to 20 minutes postoperatively, may predict parathyroid dysfunction after thyroid surgery. Allow early discharge by avoiding the need for serial calcium levels in patients found to be at low risk. When used intra-operatively, it assists in identification of patients requiring auto transplantation for questionably viable glands ***(Linblom et al., 2002).***

Aim of the Work

This work aims at prediction, diagnosis and treatment of hypoparathyroidism after thyroidectomy in cases of toxic goiter and also the role of Parathyroid hormone assay in prediction of this problem.

ANATOMY OF THE THYROID AND PARATHYROID GLANDS

A) THYROID GLAND

Developmental Embryology:-

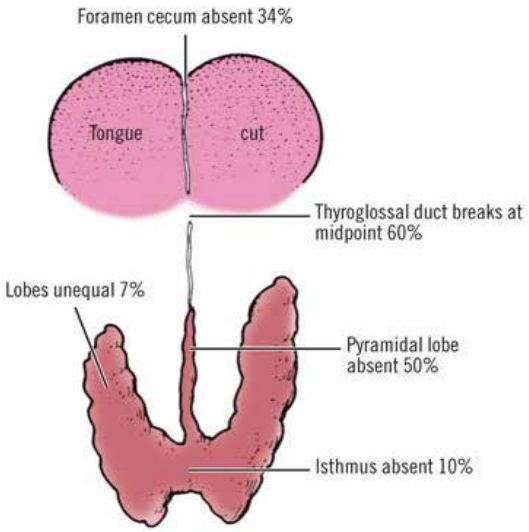
The thyroid gland has a dual embryonic origin, the thyroid Primordium which is also called median thyroid component or medial analge and the ultimobranchial body which is also called lateral thyroid component or caudal pharyngeal pouch complex. **(Takashi et al., 2006).**

The thyroid primordium is derived from endodermal epithelium from the median surface of the pharyngeal floor. It arises at the foramen caecum at around 24th day of gestation. It remains attached to the tongue by the thyroglossal duct as it begins to descend down the neck to its final position just inferior to the thyroid cartilage. **(Judith et al.,2011).**

The thyroid primordium, develops two lateral lobes connected by the isthmus. Follicles appear during the second month of gestation and increase through the fourth month. **(Skandalakis et al.,2009).**

The ultimobranchial body (UBB) is an out pocketing of the fourth pharyngeal pouch that fuses with the thyroid diverticulum. **(Takashi et al.,2006).**

Ultimobranchial body arises later in development than the median component. These fuse with the posterior portion of the median component on each side giving rise to the calcitonin-producing parafollicular or C-cells. These series of events take place before the time that thyroid gland starts producing thyroid hormones. **(Takashi et al.,2006).**



(Fig. 1): Vestiges of thyroid gland development. **(Skandalakis et al.,2009).**

Gross Anatomy of the thyroid gland:-

The thyroid gland is a butterfly shaped organ and has a weight of 15-20g; the thyroid of males is larger than that of females. It is soft and its color is red. This organ is located between the C5-T1 vertebrae of vertebral column, in front of the trachea and below the larynx. It is composed of two lobes and the isthmus that binds them together and the pyramidal lobe. **(Jameson et al.,2010).**