Total thyroidectomy versus subtotal thyroidectomy in treatment of multinodular goiter.
Meta-Analysis Study

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Esraa Ahmed Mousa Hussein

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List of Abbreviations

Anti-Tg	:	anti-thyroglobulin
BST	:	Bilateral subtotal thyroidectomy
CT	:	Computed Tomography
FNA	:	Fine Needle Aspiration
FNAB	:	Fine Needle Aspiration Biopsy
ID	:	Iodine Deficiency
MNG	:	Multinodular Goitre
NG	:	Nodular Goitre
RLN	:	Recurrent Laryngeal nerve
RLNP	:	Recurrent Laryngeal Nerve Palsy
SLN	:	Superior Laryngeal nerve
TC	:	Technetium
TMNG	:	Toxic Multinodular Goitre
TSH	:	Thyroid Stimulating Hormone
TT	:	Total thyroidectomy
US	:	Ultrasonography

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Abstract

Introduction: Multinodular goiter is a common clinical problem that usually develops during the late stage of goiter. Although it is usually benign and asymptomatic in nature, multinodular goiter may predispose the patient to compressive symptoms, develops autonomous functioning nodules, or form suspicious nodules. The clinical treatment of goiter depends on the extent of enlargement, signs and symptoms, and potential underlying causes. Thyroidectomy methods range from nodulectomy to total thyroidectomy (TT) in benign thyroid disorders. TT and bilateral subtotal thyroidectomy (BST) are the most commonly preferred methods by surgeons for MNG. The selected surgical method for thyroid disease should aim to eradicate the disease as well as to minimize postoperative complications. Many areas of surgery continually try to balance the benefits of extensive resection in terms of palliation and cure and the increased potential for complications associated with more radical procedures.

Aim of the work : To compare between two surgical techniques of treatment of multinodular goiter, total thyroidectomy and subtotal thyroidectomy as regard advantage and disadvantage of each of them.

Materials and Methods : systematic review meta analysis study.

Results: relative risk ratio of total over subtotal thyroidecdtomy is transient RLN palsy 1.828; permanent RLN palsy 1.31; transient hypoparathyroidism 2.389; permanent hypoparathyroidism 1.48, incidental thyroid carcinoma 1.691, recurrence 0.013.

This study is mainly concerned with comparing two surgical techniques of thyroidectomy in treatment of multinodular goiter, total thyroidectomy and subtotal thyroidectomy as regard postoperative complications and recurrence via a meta-analysis which showed that the advantages of total thyroidectomy include adequate eradication of the disease, prevention of recurrent goiter and avoidance of the need for completion surgery in case of occult malignancy, but it is associated with higher morbidity (postoperative thyroidectomy complications: RLN palsy and hypoparathyroidism) and the need for lifelong replacement therapy (L-thyroxin supplementation).

Keywords: BST: Bilateral subtotal thyroidectomy; MNG: Multinodular Goitre; TT : Total thyroidectomy; recurrence; postoperative complications.

Introduction

The thyroid is a highly vascular, brownish-red gland located anteriorly in the lower neck, extending from the level of the fifth cervical vertebra down to the first thoracic. The gland varies from an H to a U shape and is formed by 2 elongated lateral lobes with superior and inferior poles connected by a median isthmus, with an average height of 12-15 mm, overlying the second to fourth tracheal ring **(Dominique et al., 2015).**

Disorders of the thyroid gland constitute the second most common endocrine disease following diabetes mellitus. The prevalence of nodular goiter and thyroid autonomy is increased in regions with chronic Iodine Deficiency (ID). It has been documented that the thyroid gland adjusts to ID in the early stages by diffuse hyperplasia, while chronic exposure to ID results in nodular hyperplasia, increased colloid content and increased height of the follicular cells **(Karamanakos et al., 2010).**

Multinodular goiter is a common clinical problem that usually develops during the late stage of goiter. Although it is usually benign and asymptomatic in nature, multinodular goiter may predispose the patient to compressive symptoms, develops autonomous functioning nodules, or form suspicious nodules. The clinical treatment of goiter depends on the extent of enlargement, signs and symptoms, and potential underlying causes (**Yang et al., 2009).**

Thyroidectomy is one of the most frequent operations performed in iodine-deficient regions. In the early 20th century, thyroidectomy was associated with increased morbidity and even mortality. However, today the improvements in anesthesia and antisepsis as well as better surgical instrumentation and improvement in the surgical technique have rendered thyroidectomy an efficacious and safe treatment modality with acceptable morbidity and even unrecorded mortality **(Karamanakos et al., 2010).**

Thyroidectomy methods range from nodulectomy to total thyroidectomy (TT) in benign thyroid disorders. TT and bilateral subtotal thyroidectomy (BST) are the most commonly preferred methods by surgeons for MNG. The selected surgical method for thyroid disease should aim to eradicate the disease as well as to minimize postoperative complications **(Ciftci et al., 2015)**

Currently, the main postoperative complications of thyroidectomy are Recurrent Laryngeal Nerve Palsy (RLNP) and hypoparathyroidism **(Karamanakos et al., 2010).**

Many areas of surgery continually try to balance the benefits of extensive resection in terms of palliation and cure and the increased potential for complications associated with more radical procedures (**Citgez et al., 2013)**

The incidence of thyroid carcinoma varies from 7.5 to 13% in multinodular goiter. The presence of multiple nodules decreases the diagnostic value of fine-needle aspiration biopsy, and thyroid carcinoma is frequently an incidental postoperative histologic finding in MNG **(Tezelman et al., 2009).**

Aim of the study

To compare between two surgical techniques of treatment of multinodular goiter, total thyroidectomy and subtotal thyroidectomy as regard advantage and disadvantage of each of them.

Chapter 1

Embryology and anatomy of the thyroid gland

Embryology of the thyroid gland

The foramen cecum develops as an endodermal thickening in the floor of the primitive pharynx. The medial thyroid primordium derives as a ventral diverticulum at the foramen cecum. During the fourth to seventh week of gestation, this primitive thyroid tissue descends anterior to the hyoid bone and laryngeal cartilages to reach its final adult pretracheal position. The proximal portion of the diverticulum retracts and forms a solid fibrous stalk early at the fifth week. This thyroglossal duct ultimately atrophies, but any portion of it may persist to become the site of thyroglossal duct cyst. The distal portion of the duct gives rise to the pyramidal lobe and levator superioris thyroideae in adults. The lateral thyroid primordia (from the fourth and fifth pharyngeal pouches) descend to join the central component during the fifth week of gestation Figure (1) **(Fancy et al., 2010).**

Para follicular C cells arise from the neural crest of the fourth pharyngeal pouch as ultimobranchial bodies and infiltrate the upper portion of the thyroid lobes (**Lai et al., 2015).**

Anatomy of the thyroid gland Figure (2)

The thyroid gland weighs between 15 and 25 g in adults, and comprises 2 lateral lobes connected by a central isthmus.

Each lobe is approximately 4 cm in length, 2 cm in width, and 2 to 3 cm in thickness **(Fancy et al., 2010).**

A pyramidal lobe may extend superiorly from the isthmus or from the medial portions of the left or right lobes. The thyroid extends from the level of the fifth cervical vertebra to the first thoracic vertebra.

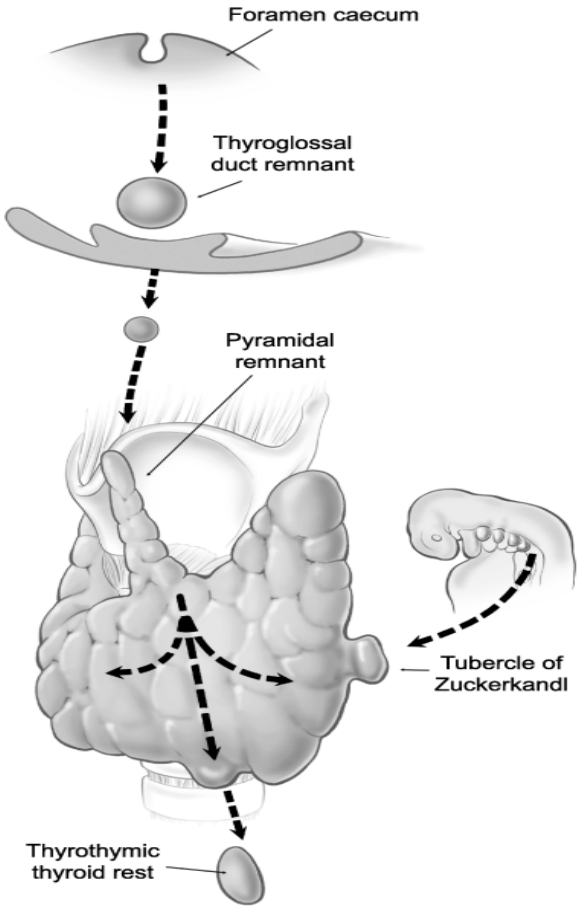

Figure (1): Embryological development of the thyroid gland **(Delbridge, 2003).**

The thyroid is surrounded by a sleeve of pretracheal fascia. Posteriorly, a thickening of this fascia attaches the gland to the cricoid cartilage. This fascia is the lateral ligament of the

thyroid (ligament of Berry). The anterior surface of the thyroid is related to the deep surface of the sternothyroid, sternohyoid, and omohyoid muscles. Laterally, the gland is related to the carotid sheath. Medially, the superior part of the thyroid is related to the larynx and laryngopharynx. Medially, the inferior part of the thyroid is related to the trachea and the esophagus. The isthmus of the thyroid lies anterior to the second and third tracheal rings **(Stewart and Rizzolo, 2012).**

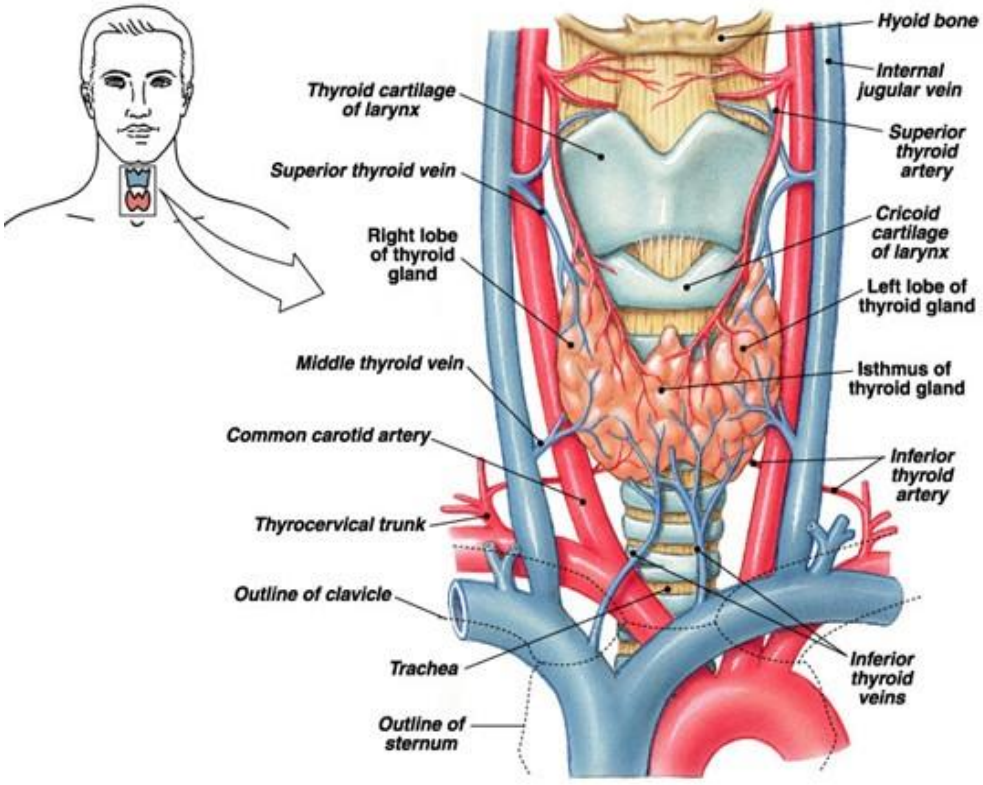

Figure (2): Anatomy of the thyroid gland **(Martini et al., 2001).**

Blood supply

Arterial supply Figure (3)

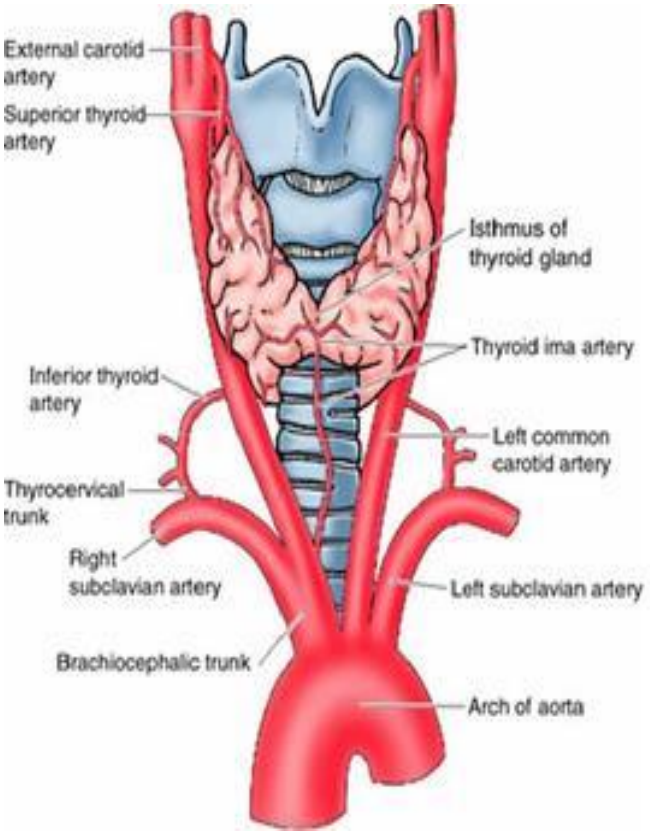

Figure (3): The arterial supply of the thyroid **(Moore et al., 2010).**

- **The superior thyroid artery**

The superior thyroid artery is a branch of the external carotid artery arising close to the carotid bifurcation. It travels on the external surface of the inferior constrictor muscles of the larynx, along with the superior thyroid vein, entering the gland posteromedially just below the highest point of the upper lobe **(Mohebati and Shaha, 2012).**

At this point, it lies superficial to the external branch of the superior laryngeal nerve **(Fancy et al., 2010).**