

THYROTOXICOSIS

THESIS

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INTRODUCTION

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Thyrotoxicosis is considered as one of the important diseases affect man. Thyrotoxicosis is more common in females most probably due to the psychic disturbances which occur during menstruation, pregnancy and menopause.

Thyrotoxicosis is a disease affecting the various body systems without exception, leading to disturbance of patient's health, so for these reasons efforts to find the best method of diagnosis and management has never stopped.

Thus from time to time researches are offered to allow accurate and early management of the disease. In the following work the important aspects of this disease are discussed.

- Embryology of the thyroid gland:

The thyroid gland appears to develop from two embryological structures are the central median thyroid diverticulum from the floor of the pharynx and two lateral structures are the ultimobranchial bodies, the contribution of the former structure to the thyroid development has been recognized for many years but that of the latter has become better understood more recently. The median diverticulum contributes the follicles in which thyroxine and triiodo thyronine are synthesized but the ultimobranchial bodies are distinct with calcitonin synthesis, thyroid tissue can be seen in an embryo 8 weeks (25mm) but it does not take up radio active iodine until 12 weeks (68mm) at that time colloid could be seen in thyroid follicles. The median thyroid primodium could be identified as out growth from the center of the floor of the mouth one month after conception, when embryo measures 3.5 - 4mm in diameter, this area of endodermal thickening grows forward and caudally into the mesenchym to become a diverticulum lined with foregut epithelium, when distal end of it is expanded by cell division develops into two incompletely separated parts which constituting the lateral lobes and the isthmus of the thyroid, the stalk of the

diverticulum elongates to become the thyroglossal duct, where it subsequently has atrophied extending between foramen caecum and isthmus but distal part may remain as the pyramidal lobe which is recognizable in about 75% of postnatal specimens, the lateral lobes of adult gland are derived from the ultimobranchial bodies which progress to fuse medially with the thyroid, among the origin suggested is the ventral component of 4th pharyngeal pouch and the neural crest.

In serial sections of embryos these bodies appear to be associated with 4th pharyngeal pouch from which they subsequently separate to fuse with the developing lateral lobes of the thyroid. The ultimobranchial bodies contribute the parafollicular "C" cells to the parenchyma of the gland where these cells are of particular interest because they are the cells of origin of medullary carcinoma.

3rd and 4th pharyngeal pouchs make no farther contribution to the formation of the thyroid but are related to origin of the thymus and parathyroid glands which are closely related to thyroid gland. 3rd pharyngeal pouch develops to form the thymus and

inferior parathyroid but 4th pouch becomes the superior parathyroid of the adult anatomy, the position of the parathyroid glands in adults is therefore different from that in the embryo because the inferior parathyroid is down to inferior position by developing thymus descending to the mediastinum, if the inferior parathyroid separates from the thymus late in its descent from the neck, it may lie in the mediastinum of the adult along with the thymus, during development the median diverticulum is closely related to the aortic sac blood vessels which arises from the primitive heart tube and gives rise to branchial arch arteries, as development proceeds, the aortic sac fuses with the external carotid arteries to become the superior thyroid artery on each side. In adult a persisting aortic connection may occasionally be found as the *arteria thyroidea ima*. Inferior thyroid artery in adult is branch of subclavian artery which itself is partly developed from the artery of the 4th pouch.

The arrangement of the arteries to thyroid in adult constitutes further evidence that thyroid gland develops from more than one origin. (Beaugie, j.M,1975).

- Surgical Anatomy of the thyroid gland:

The thyroid gland is a brownish red highly vascular organ lies in the soft tissues of the lower part of the neck anteriorly, it extends from the level of 5th, 6th, 7th cervical and 1st thoracic vertebrae.

In newly born baby it weights about 1 : 5 grams in young adult is about 25 grams, its weight tends to fall at the approach of old age, the normal weight in adult varies from 10 : 50 gm., weight being partly governed by geographical factors. It consists of right and left lobes connected by the isthmus, the lobes are approximately conical in shape, the apex of each is ascending and diverging laterally to the level of the oblique line of thyroid cartilage, the base is on a level with 4th, or 5th tracheal ring, each lobe is about 5 cm long, its transverse and anteroposterior dimensions being about 3 cm and 2 cm respectively. (Beaugie, 1975).

The Fascia:

The gland is ensheathed by a layer of pretracheal fascia of the deep cervical fascia, it covers the anterior aspect of the gland and on reaching its posterolateral border splits into two layers, one

encloths the whole posterior aspect and has bilateral thickening at and just above the level of the isthmus, is attaching the gland to the trachea and the lower border of the cricoid cartilage, the second layer is more posterior passes behind the oesophagus and is continuing upwards on the posterior wall of the pharynx it attaches to the pre vertebral fascia laterally thus forming a well defined retro pharyngeal and retro oesophagal space. Anteriorly in the midline the pre-tracheal fascia continues up to be attached to the hyoidbone, more laterally it fuses with the fascia of the thyrohyoid muscles and with the fascia surrounding the infrahyoid muscles and combined layers of fascia fused with the fascia surrounding the carotid sheath. The condensation of connective tissue which attaches the gland to the trachea and the lower border of cricoid cartilage has been named the suspensory ligament by berry in 1888 but named after berlin 1935 and Armstronge and Hilton 1951 as the adherent zone. (Bowden, 1885).

The relations of the lobes:

- The postero medial aspect in each lobe is attached to the side of the cricoid cartilage by ligamentous band is called the lateral ligament of the thyroid gland.

- The lateral or superficial surface is convex, external to the sheath of the pretracheal fascia, it is closely covered by the sternothyroid muscle, more anteriorly are the sternomastoid and the superior belly of omohyoid muscle.

- The medial surface is adapted to the larynx and the trachea at its superior pole, it is in contact with the inferior pharyngeal constrictor muscle and the posterior part of the cricothyroid which intervenes between the gland and the posterior part of the lamina of the thyroid cartilage and the side of the cricoid cartilage, the external laryngeal nerve is medial to this part of the gland on its way to the cricothyroid, below it is related to the side of the trachea in front and to the recurrent laryngeal nerve especially on the left side and to the oesophagus posteriorly.

- The posterolateral surface is related to the carotid sheath and overlaps the common carotid artery.

- The anterior border of each lobe is closely related to the anterior branch of the superior thyroid artery which is thin and descends obliquely and medially.

- The posterior border is blunt and rounded, lies between the posterior and medial surfaces, it is closely related below to the inferior thyroid artery and an anastomosing branch which connects it to the posterior branch of the superior thyroid artery, the parathyroid glands are related to it on both sides, also the thoracic duct is related to the lower part of the left posterior border. (Beaugie, 1975).

The isthmus:

- It connects the lower parts of the two lobes, it measures about 1.25 cm transversally and the same vertically and usually extends anterior to the 2nd, 3rd and 4th tracheal rings, it may be at higher or lower level, anteriorly it is separated by the pretracheal fascia from the sternothyroids, more superficially it is covered by the sternohyoid, anterior jugular veins, the fascia and the skin.

- The upper border, an anastomosing branch uniting the two superior thyroid arteries running along it.
- The lower border at which the inferior thyroid veins leave the gland. The isthmus may be absent.
- Conical third lobe is often present is called the pyramidal lobe, it ascends towards the hyoid bone from the upper part of the isthmus or from the adjacent part of either lobe, commonly the left. It occasionally quite detached or may occur as two or more separate parts.
- Fibromuscular band may descend from the body or the hyoid bone to the isthmus of the gland or its pyramidal lobe when muscular it is termed the levator of the thyroid gland.
- Small detached masses of thyroid tissue may occur in the vicinity of the lobes or superior to the isthmus are called the accessory thyroid glands.
- Vestigues of thyroglossal duct may persist between the isthmus and the foramen caecum of

the tongue and may give rise to accessory nodules or cysts situated in or near the median plane and even in the substance of the tongue. (Beaugie, 1975).

- The blood supply:

The arterial blood perfuses the normal thyroid gland at a rate of about 50 ml/min, which for each unit mass of thyroid tissue is about twice the flow through the kidneys or one fifth of that through the lungs.

(1) The superior thyroid artery:

It arises on each side of the neck from the carotid artery system, dissection of 100 arteries showed that 46% arise as the first branch of the external carotid artery, 18% arise from the common carotid artery, 36% arise from the bifurcation of the carotid artery, It passes close to the superior laryngeal nerve before reaching the upper pole of the gland, at the gland, it divides into its two terminal anterior and posterior branches which supply the thyroid and anastomose freely with other vessels. (Beaugie, 1975).