

Anatomical Variations of Thyroid Gland & Its Clinical Significance

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Abstract: Thyroid gland is located anteriorly in the neck at the level of 5,6,7cervical & 1thoracic vertebrae. It lies deep to sterno thyroid & sterno hyoid. The morphological variations are usually diagnosed incidentally during examination for other thyroid diseases. This study was done to observe the gross anatomical features of the thyroid in 30 cadavers [21male 9female] 20 from anatomy & 10 from forensic medicine at Rajiv Gandhi institute of medical sciences ongole, Andhra Pradesh. In our study we observed lobes of thyroid, absence of isthmus, pyramidal lobe, levator glandulae thyroidea, accessory thyroid tissue. This study highlights the various developmental anomalies of the thyroid gland which is an useful information in the treatment and for safe and effective surgeries to clinicians.

Keywords: Morphological variations , thyroid gland , pyramidal lobe, levator glandulae thyroidea, isthmus, accessory thyroid tissue

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I. Introduction

Thyroid gland is a brownish red, a highly vascular ductless gland. It lies deep to sterno hyoid & sterno thyroid muscles, located anteriorly in the neck at the level of 5 cervical to 1 thoracic vertebrae. It consists of 2 lobes which are connected by isthmus at the lower region. A fibro muscular band, the levator glandulae thyroidea descends from body of hyoid bone to upper border of isthmus. A third conical pyramidal lobe is often present extending upward towards the hyoid bone from upper border of isthmus. It is attached to any one of the 2 lobes most commonly to left, sometimes it may appear as a separate mass. The pyramidal lobe & levator glandulae thyroidea develop from remnants of epithelium and connective tissue of thyro glossal duct. The developmental anomalies of thyroid distort the morphology and cause clinical, functional disorders and various thyroid illness reported by Arriaga MA et al 1988¹ & Melnick JC 1981². Accessory nodules and ectopic tissue of thyroid are usually found at the embryonic origin of thyroid gland at the foramen caecum or on lingual duct & thyro glossal tract with in tongue studied by Bergman RA 2004³. It is also seen at anterior mediastinum, reported by Sand J et al 1996¹⁶, in heart by Casonova JB et al 2000⁵, in lung by Bando T 1993². Ectopic thyroid tissues may later undergo malignant changes studied by Sand J et al 1996¹⁶ & Harick 1999⁷. The aim of present study is to highlight morphological variations and various developmental anomalies of thyroid gland where it attains clinical importance in day to day practice in routine medical & surgical interventions.

II. Materials & Methods

In the present study observations were made on cadavers while they were used for routine dissection classes for medical undergraduate students over a period of 5 years. Dissections were performed on the neck region of 20 cadavers of both sexes, [14 male, 06 female] in the department of anatomy & 10 cadavers of both sexes [16 male & 3 female] from department of forensic medicine at RIMS Ongole Andhra Pradesh India. The thyroid gland was exposed according to Cunningham's practical manual of anatomy and studied for any variations & developmental anomalies including partial & total agenesis of the gland, presence of ectopic tissues or accessory thyroids, permanent thyroglossal duct anomalies such as cyst, fistula, sinus and pyramidal lobe fibrous band levator glandulae thyroidea were observed. The specimens were photographed and the findings were appropriately documented.

III. Results

The anatomical variations observed in present study on 30 cadavers are shown in table no.1. In our study, we have seen levator glandulae thyroidea, in 9 males and in 2 females, pyramidal lobe in 4 males and 9 females, absence of isthmus in 2 males and accessory thyroid tissue in 1 male cadaver out of 30 cadavers.

Both the absence of isthmus and pyramidal lobe are seen in one cadaver, absence of isthmus and accessory thyroid tissue in one cadaver.

IV. Figures And Tables

Table no 1

S.no	Variation type	male	female	total
1	Pyramidal lobe	4[13.33%]	9[30%]	13[43.33%]
2	Levator glandulae thyroideae	9[30%]	2[6.66%]	11[36.66%]
3	Absence of isthmus	2[6.66%]	0	2[6.66%]
4	Accessory thyroid tissue	1[3.33%]	0	1[3.33%]

The accessory thyroid tissue is confirmed after histological study

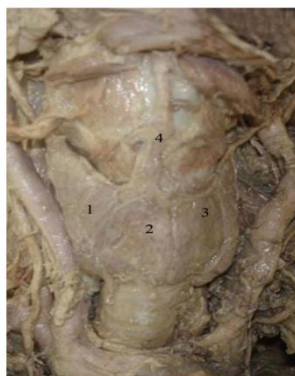


Fig.
Thyroid gland with levator glandulae thyroideae (1) right lobe of thyroid (2) isthmus (3) left lobe of thyroid (4) levator glandulae thyroideae arising from isthmus.



Fig.
Thyroid gland with absence of isthmus & presence of pyramidal lobe (1) right lobe of thyroid (2) absence of isthmus (3) left lobe of thyroid (4) pyramidal lobe arising from left lobe.

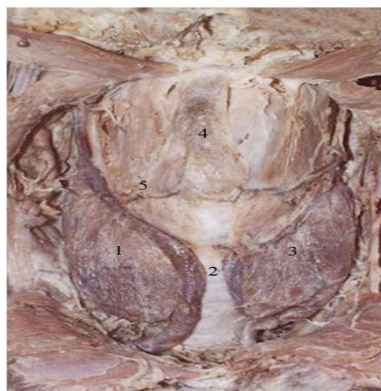


Fig.
Thyroid gland with absence of isthmus & presence of accessory thyroid tissue (1) right lobe of thyroid (2) absence of isthmus (3) left lobe of thyroid (4) accessory thyroid tissue (5) blood supply to the accessory thyroid tissue

V. Discussion

Thyroid disorder is a common health problem among large number of endocrinopathies which is increasing day by day due to lifestyle changes. About 5% of total population are suffering from various thyroid disorders. The size and shape of thyroid gland may alter with age, gender, race physiological condition and geographical location. It may be larger and heavier in females than males and hypertrophies during menstruation & pregnancy as reported by Fakhrul AHB et al [2010]⁶. Diseases of thyroid like goiter, thyrotoxicosis, adenomas, carcinoma etc.. are usually associated with enlargement of gland and require medical and surgical intervention by Strachan MW J [2006]¹⁸. The variations of thyroid are due to partial persistence of median or thyro glossal duct by Melnick JC et al [1981]¹² and developmental failure results in agenesis or hemiagenesis that may be unilateral by Kaplaw EL et al [1994]¹⁰. Thyroid hemiagenesis and case report incidentally discovered papillary carcinoma of thyroid reported by Pizzini et al [2005]¹⁵. This study is done to describe variations and developmental anomalies including partial and total agenesis of thyroid, permanent thyroglossal duct anomalies such as cyst, fistula, sinus and pyramidal lobe or fibrous band, presence of ectopic tissues or accessory thyroids. Non union of isthmus was reported by Yuksel M et al [1995]²¹ & Marshall C.F [1895]¹¹ reported absence of isthmus in 10% cases isthmus was absent in 4 cases out of 58 cadavers studied by Braun et al [2007]⁴. J.F Pastor Vazquez [2006]⁸ described a case of thyroid isthmus agenesis the incidence

varying from 5% to 10%. The frequency of the pyramidal lobe was 76.8% in thyroid glands of Koreans [2002]²⁰. M.J PHUKON et al, [2012]¹³ reported pyramidal lobe arising from right side. SOEMMERRING [1794]¹⁷ described the levator glandulae thyroideae as an accessory muscle which runs from hyoid bone to insert partly on thyroid cartilage and partly on isthmus and partly on isthmus of thyroid gland. SULTANA SZ et al [2009]¹⁹ reported levator glandulae thyroideae in 43.33% in Bangladesh & JOSHI et al [2010]⁹ reported in 30% cases. The possible origin of ectopic thyroid tissue in parotid salivary gland could be due to a common evolution of thyroid and parathyroid glands as a heteroplasia or a metaplasia by MYSOREKAR et al [2004]¹⁴.

VI. Conclusion

Knowledge of anatomy of thyroid gland and its variations is important for routine surgical and medical interventions, for endocrinologists, surgeons & clinicians to diagnose and treat the diseases. Proper identification of thyroid gland vessels is very important in order to avoid major complications during surgeries of neck region

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