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CASE REPORT

# Pyramidal Lobe of the Human Thyroid Gland: A Case Report

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## Abstract

### Objective

The pyramidal lobe is an auxiliary lobe of the thyroid gland obliviously overlooked by students during routine dissection and sometimes undermined by surgeons, physicians, radiologists, and endocrinologists during management of thyroid related disorders. Pyramidal lobe is a keen organ to investigate within the visceral compartment of the neck and its significance ought to be emphasized during exploration and resection of this structure in primary thyroid operations.

**Method:** Dissimilarity was encountered during routine cadaveric dissections, overlying neck muscles were exposed, and the tissue was examined.

**Results:** The macroscopic assessment revealed a capsulated glandular tissue with three lobes. Pyramidal lobe was located deep to the strap muscles of the neck at the midline below the Adam's apple.

**Conclusion:** Pyramidal lobe is considered a normal component of the thyroid gland with variable morphology and position. Its removal during surgery of the thyroid to treat non-malignant disease cases has proven to significantly reduce chances of cancer recurrence.

**Key Words:** *Pyramidal lobe; Anatomical Variation; Thyroglossal duct; Levator glandulae thyroideae; Thyroid gland*

## Introduction

Thyroid gland is a component of the endocrine system located at the base of the neck. The endocrine system is one of the major communication systems of the body that link different cells of the body for the purpose of achieving a coordinated function of an organism [1]. Specific hormones, which enter the blood almost directly, are secreted by specific endocrine glands. The thyroid gland is the largest pure endocrine gland in the body [2]. It comprises two lateral lobes (left and right) connected along the midline of the neck by an isthmus, and these lie deep to the strap muscles of the neck, anteriorly at the level of the C5–T1 vertebrae [3]. Additionally, a pyramidal lobe may extend superiorly from the isthmus of the thyroid gland, usually to the left of the median plane [4]. Pyramidal lobe is a remnant of the developing thyroglossal duct, which is concerned with the descent of the developing thyroid gland from the posterior third of the tongue to its ultimate position in the visceral compartment of the neck

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[5]. Later in development, this duct usually disappears; however, in certain cases where it persists numerous congenital anomalies arise, one of which is the pyramidal lobe [6].

The incidence of pyramidal lobe has been scarcely reported in standard anatomy textbooks; however, scholarly articles have demonstrated its occurrence in 60-65% of the patients, thus placing it as a major component of the thyroid [7]. The lack thereof has to be considered a congenital variant [3]. As far as its position and extent are concerned, pyramidal lobe is mostly situated on the left side of the midline, although right side occurrence is not uncommon. It varies in size and dimensions, depending on the presence of fibrous (thyroglossal duct) or muscular bands (levator glandulae thyroideae) [3].

## Case Report

A male, African cadaver, with unknown cause of death, was obtained by Faculty of Medicine, Uzima University for cadaveric dissection by first year medical gross anatomy course in accordance with the Anatomy Act Cap 249, Republic of Kenya. All ethical issues were considered in writing the case report. The identity, discretion, confidentiality, and permission regarding the specimen were all maintained. Aside from the exposed femoral vessels used for primary trans arterial perfusion by government mortuaries, there was hardly any significant surgical history observed on the cadaver. The postmortem report recovered from the hospital recorded the cadaver was a 42-year-old male of an average height and weight.

After secondary embalming, the specimen was carefully dissected in order to expose the thyroid gland and related structures. The pyramidal lobe was discovered during dissection of the midline structures of the neck and photographs were captured. Examination of our specimen preserved for dissection revealed a gross distortion of the normal anatomy of the thyroid gland. Clear recognition was facilitated by defining the upper border of the isthmus and the lateral border of the pyramidal lobes. The pyramidal lobe was situated on the right side (Figure 1).

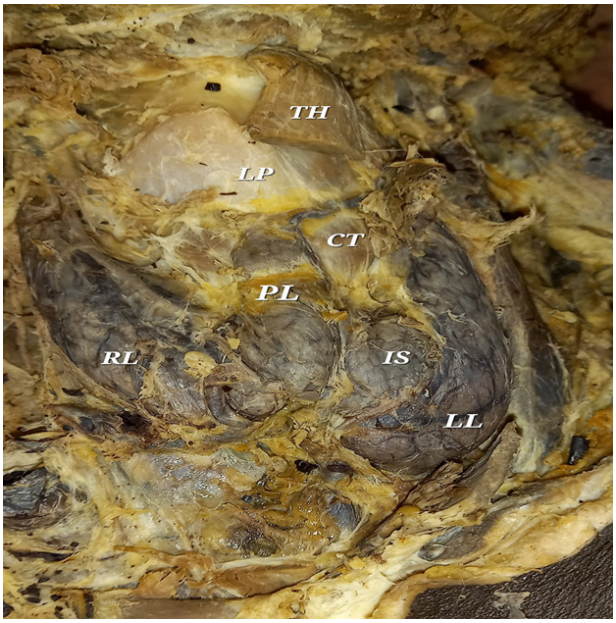


**Figure 1)** *Pyramidal lobe (PL) of the human thyroid gland. It is right-sided and is attached at the junction between right lobe and the isthmus of thyroid gland. Legend: RL – Right thyroid lobe; LL – Left thyroid lobe; IS – Thyroid isthmus; LP – Laryngeal prominence; CT – Cricothyroid muscle; TH – Thyrohyoid muscle (reflected)*

## Discussion

The thyroid gland arises from the floor of the pharynx. Hegazy [8] stated that its origin is distinguished by the median foramen cecum located between the anterior and posterior thirds of the tongue. It begins as a small depression that extends caudally to form the thyroglossal duct which reaches its final position in front of the larynx and trachea by about the 7$^{th}$ week of fetal life. It expands at its distal end to form two solid lobes connected by an isthmus as it degenerates itself. The author added that ductal degeneration defects can lead to the formation of a pyramidal lobe that may be connected to the hyoid bone by levator glandulae thyroideae (Figures 2 and 3). Variations of the thyroid gland

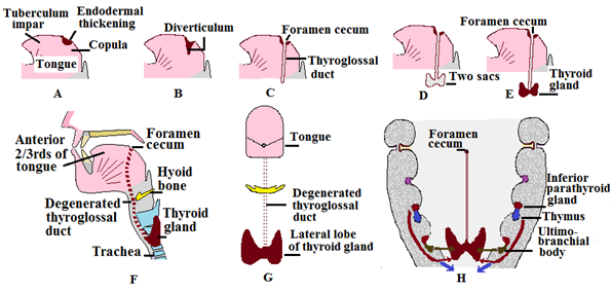


**Figure 2)** *Development of thyroid gland (about Hegazy, 2014).*

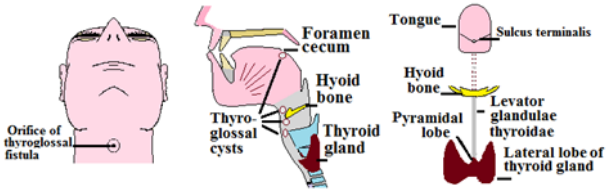


**Figure 3)** *Congenital anomalies of thyroid gland due to remnants of thyroglossal duct (about Hegazy, 2014).*

mostly are caused by disturbed organogenesis of the thyroid gland. This could be in form of partial persistence of the median or thyroglossal duct or tract [9]. Braun et al. and Ranade et al. reported the presence of the pyramidal lobe in 55.2% of cases which was slightly lower than that recorded by Tanriover et al. Zivic et al. and Ozgur et al. who found the pyramidal lobe in 57.8%, 61% and 65% of cases [7, 9-12]. The high incidence of the pyramidal lobe has made the structure be appreciated as normal, and therefore its likelihood ought not to be discounted during preoperative diagnosis of patients [10]. Morphology of the pyramidal lobe has been reported to vary from pyramidal, triangular, string or even flat [7]. While some authors describe the extent of the pyramidal lobe in relation to surrounding structures [13], information regarding its length significantly varies. Braun et al. [10] in their study recorded a median length of 24.1 mm with a range of 3-63 mm, while a range of 10–15 mm was noted in a different study by Filho et al. [14]. In present case, upon measurement, the length of pyramidal lobe was determined to be 13 mm which fell short of the range reported by Geraci et al [15] who found the average length to be 20 mm. It is noteworthy that very long pyramidal lobe usually has thin diameter [16].

Based on position, with the origin being the upper border of the isthmus, pyramidal lobe is directed upwards in the midline or slightly to the left or the right and is attached to the thyroid cartilage by fibrous tissue which is believed to originate from two structures [13]. A histological study by Sprinzl et al., found out that the thyroglossal tract gave rise to the fibromuscular band as a predominantly left-sided structure present in 41.3% of newborns and children [17]. Additionally, pyramidal lobe may be an extension of levator glandulae thyroideae, an accessory and variable muscle that has been reported to occur in 0.49% to 31.2% of cases [17]. This was proven by Freilinger et al. [16] through histopathology studies whereby following ultrasound and consequent dissection, histopathological workup revealed longitudinally arranged muscular, fibrous, and fatty tissue, akin to levator glandulae thyroideae muscle.

The origin of pyramidal lobe is highly relative with most studies indicating the upper border of the isthmus, the medial border of the lateral lobes or the upper poles [10,18,19]. Other studies claim that the most frequent position (40-60%) of the pyramidal lobe origin is the left side of the isthmus or the left thyroid lobe. Zivic et al., (2011) reported that pyramidal lobe arose most often from the midline (49%) and the right side (36%) and less often from the left (15%) of the isthmus, with no single evidence of lobar origin [7].

The incidence of pyramidal lobe has been reported to be higher in males (62%) than in female (50%) patients [10]. This has since been disproved by Hakeem et al., & Sturniolo who found that the frequency of occurrence of pyramidal lobe was higher in females (61%) than in males (50%) [20,21]. The gender controversy has been argued vis-à-vis thyroid pathologies, in that; pyramidal lobe is commonly found in

females owing to increased incidence of thyroid pathologies. It is noteworthy that pyramidal lobe is more frequent in patients younger than 50 (67%) than older (54%) and physiological atrophy has been pointed out as the cause of this [7].

Knowledge of pyramidal lobe is essential for safe and effective surgeries of the thyroid. Thyroid gland, like many glands in the body, is subject to metastases [22]. In a study done by Geraci et al, [15] it was reported that pyramidal lobe was affected by the primary disease of the thyroid gland in patients with diffuse diseases. The involvement of pyramidal lobe in malignant diseases therefore signifies that it is a normal component of the thyroid, and it should be resected along with other relevant parts of the gland [23]. This total ressection has proven to reduce chances of local recurrence of non-malignant diseases; it has significantly rendered carcinoma patients permanently free of disease [24] and it has elevated serum thyroglobulin sensitivity in patients with differentiated thyroid cancer [25]. It has been documented to be a favorite site for radio-iodine uptake after surgical operation of diffuse cancer during postop scintiscan [15]. That notwithstanding, authorities have established that only in rare cases is the pyramidal lobe considered a site of primary thyroid disease [26] however, in terms of recurrence of benign diseases, for example, after total and subtotal resection of the gland, pyramidal lobe is the site most frequently affected [27]. Its preservation on the other hand, after surgery, has proven useful in patients with C-cell hyperplasia due to the simple fact that it does not contain C-cells [28,29].

## Conclusion

Pyramidal lobe of the thyroid gland is a common occurrence and ought to be regarded as normal component of the thyroid gland as opposed to an ectopic tissue. In instances of diffused disease related to thyroid gland pyramidal lobe will be affected, hence resected alongside other vital parts of the gland.

## Acknowledgments

Permission was obtained from the Department of Human Anatomy of Uzima University. First year medical students at the University were present at the time of identifying the tract.

## Competing Interests

The author declares no conflicts of interest in this work.

## Ethical Approval

Legally, Uzima University, a medical institution, with permission from the Ministry of Health, is permitted by the Anatomy Act Cap 249 to procure unclaimed bodies for studies.

## Informed Consent

The samples used were from bodies that remained unclaimed for period exceeding eight months sourced from public mortuaries of government hospitals. Acquisition warranted documented consent from the ministry of health, through the medical superintendent, authorizing the specimen for anatomical studies in Uzima University. Informed consent of the patient did not apply since this was a cadaveric case study.

However, all ethical issues were considered in writing the case report, for example, the cadaver's identity, privacy, confidentiality were all maintained and permission to use the cadaver for our study was obtained from the Department of Anatomy of Uzima University.

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