STUDY OF INCIDENCE OF PYRAMIDAL LOBE OF THE THYROID GLAND IN RAYALASEEMA REGION AND ITS CLINICAL IMPLICATIONS
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ABSTRACT

BACKGROUND
Because of its embryonic origin, the thyroid gland is predisposed to multiple anatomical variations and developmental anomalies. These include the pyramidal lobe, the origin of levator glandular thyroideae, the absence of the isthmus, ectopic thyroid, accessory thyroid tissues, etc. The developmental anomalies and anatomical variations are of clinical significance especially to researchers, anatomists and surgeons. We wanted to study the incidence and clinical implications of pyramidal lobe of the thyroid gland.

METHODS
A total of 38 male and 12 female properly embalmed cadavers were taken. Neck region was dissected and the thyroid gland was observed for the presence of Pyramidal lobe.

RESULTS
The pyramidal lobe of thyroid gland was observed in 17 out of 50 cadavers.

CONCLUSIONS
Having knowledge about the anatomical variations of thyroid gland is essential for surgeons and anatomists.

KEYWORDS
Pyramidal Lobe, Thyroid Gland, Cadaver, Thyroglossal Duct

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BACKGROUND
Thyroid gland is a highly vascular endocrine gland with 2 lateral lobes joined in the middle by an isthmus. The thyroid gland is concerned with regulating basal metabolic rate, blood calcium level and growth and development in mammals. It is situated anteriorly in the neck at the level of the fifth cervical to first thoracic vertebrae deep to the platysma, sternothyroid, and sternohyoid muscles. Ever since the pyramidal lobe (PL) of the thyroid gland was first described in 1749 by Pierre Lalouette de Vernicourt (gland of Lalouette), its incidence along with its morphological variation (in terms of presence, position, size and extent) have been observed. Embryologically, the PL of the thyroid gland is derived from remnant of the thyroglossal duct situated in the pre-tracheal region between the isthmus and the hyoid bone during the descent of the foetal lingual thyroid to its normal anatomical position in intrauterine life. The PL may originate from the isthmus or on either lobe of thyroid gland, with a slight predilection for the left lobe. The PL may be connected to the thyroid cartilage or attached to the hyoid bone and divided into two or more parts. Variations in its length could be as much as 15-30 mm. Macroscopically, the PL can be pyramidal, an inverted Y, a nodule, string-like or flat. The presence of a asymptomatic PL may be missed clinically, however, radiologic investigations and intra-operative exploration reveal its presence in up to 50% of cases. Staglizer¹ (1941) stated that the pyramidal process develops from the lower part of thyroglossal duct by the differentiation of the duct tissue into glandular tissue. The length of the pyramidal process varies depending on the position of fragmentation of the thyroglossal duct. Braun et al in 2007 states that pyramidal lobe could be a source of pitfall during thyroidectomy due to frequent but unreliable preoperative diagnosis on scintigraphic images. Geraci et al in 2008 opined that Pyramidal lobe in 50% of cases may go undetected while performing preoperative diagnostic procedures like USG or TC-99m pertechnetate scan. Further there are instances where non-removal of pyramidal lobe during a total thyroidectomy for a thyroid carcinoma can lead to recurrence of the disease. All these emphasise the importance of study of pyramidal lobe of thyroid gland. This study aims on reporting the developmental anomaly namely the pyramidal lobe associated with thyroid gland in Rayalaseema region.

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METHODS
The study was conducted on 50 formalin-fixed adult cadavers, out of which 38 were males and 18 were female cadavers used for routine dissection classes for medical undergraduate and anatomy postgraduate students. Ethical clearance was taken from the local ethical committee. The neck region of the cadavers was dissected according to Cunningham’s practical manual of anatomy to expose the thyroid gland. The dissected region was carefully observed for the presence of pyramidal lobe. During the dissection, variations which were present were noted and photographed.

RESULTS
In the present study, the incidence of pyramidal lobe is 34%. Amongst males, the pyramidal lobe is seen in 14 cases (36.84%) and in females it is seen in 3 cases (25%). It shows that the incidence is more in males than in females. In most of the cases, it originated from the left side.

DISCUSSION
According to OO Ayandipo et al., Pyramidal lobe was found in 44.0% of cases. The presence of the pyramidal lobe was most often associated with multinodular goitres 61.8% and least found in thyroids with malignant tumours 4.4%. The pyramidal lobe originated commonly from the midline (50.0%) and least from the right (10.3%). The length of the pyramidal lobes ranged from 8 to 80 mm (average 50 mm) in males and 5 to 54 mm (average 42 mm) in females. Excision of an existing PL is important to the endocrine surgeon firstly, to avoid recurrence due to residual thyroid tissue following incomplete total thyroidectomy. Secondly it permits the use of adjuvant radioactive iodine therapy in differentiated thyroid cancer as follow-up treatment; which will hitherto not be possible without complete extirpation and thirdly it increases the sensitivity of post-surgical serum thyroglobulin level monitoring in patients with differentiated thyroid cancer as being from a metastatic site only and not from a thyroid gland remnant. According to Dessie MA et al., the pyramidal lobe was noted in 52.5% of the cadavers. When the incidence of PL was compared between sexes, it was observed in 66.7% of female and 50% of male cadavers. In one of the male cadavers, the PL was found on both sides at the junctions of the isthmus to the lateral lobes. According to Dr Vijay Laxmi et al., the pyramidal lobe was present in 40% of cases. It was located on left side in 66.6% of cases, on right side in 16.7% and median in 16.7% of cases. The pyramidal lobe was quadrangular in 75% and triangular in 25% of cases. The mean length of the pyramidal lobe was 2.3 cm ranging from minimum 1.0 cm to maximum 4.6 cm. According to Dr Namitha Viswanath, pyramidal lobe was noted in 32% of cases. The study showed no significant statistical difference in males and females According to Milojevic B et al., the pyramidal lobe was found in 55.2% of cases as a single conical extension of the thyroid gland. It was present more often in male (53.1%) than in female (46.9%) specimens and located slightly more often on the left side of the midsagittal plane (53.1%). According to the origin and location of its base, they defined five types of pyramidal lobe, with the left-sided
types (Types III and IV) being predominant. In addition, they found that the size of the pyramidal lobe was dependent on the presence of a fibrous or muscular band that may represent a fibrous remnant of the thyroglossal duct or the levator glandulae thyroideae muscle. The pyramidal lobe was four times longer and its base was two and a half times wider and three times thicker when it was associated with this band. According to Prakash et al, the pyramidal lobe was present in 43.9% male and 22.2% female cadavers and was more prevalent on the left side of the median plane. According to Zivic R et al, pyramidal lobe was found in 61% of the cases. The lobe of Lalouette was found more often in women (61.96%) than in men (50%) and more often (67.3%) in patients less than 50 years old than in those older than 50 (54.2%). The lobe branched off more frequently from the midline (49.18%) than from other parts of the isthmus; its length ranged from 8 - 40 mm, with a median length of 20.13 mm. According to Joshi SD et al, pyramidal lobe was present in 37.77% cases and it was attached either to the isthmus or the lateral lobes. It was observed that the maximum number of pyramidal lobes was attached to the left lobe (47.05%), as compared to the right lobe or the isthmus. In 32.55% and 20.58% of cases, it was attached to right lobe and isthmus, respectively. According to Geraci G et al, frequency of the PL is between 15% and 75%, PL is in 10-17% of normal subject and in 43% of patients with multinodular goiter. According to Sultana S et al, 50% of the thyroids possesses pyramidal lobe. Incidence was more in male (52.1%) than in female (41.7%) and commonly situated on the left side. According to Braun EM et al, a pyramidal lobe was found to be present in 55% of the cadavers. It was found more frequently in men than in women. According to Cengiz, pyramidal lobe was observed in 18% of cases by scintigraphy. In 81% of cases, pyramidal lobe was found in females and in 19% it was observed in males. Pyramidal lobe stemmed from the left lobe in 48% of cases, from right lobe in 40% of cases and from isthmus in 12% of the cases. Pyramidal lobe visualization rate was 18% for euthyroidism and hyperthyroidism and as 15% for hypothyroidism. The rate of pyramidal lobe visualization was 13% in nodular goiter cases, 43% in diffuse goiter cases and 20% in cases where its scintigraphy showed normal thyroid glands. In the statistical evaluation, rate of pyramidal lobe visualization in diffuse goiter cases was found to be significantly higher when compared to other cases. The author opines that preparative imaging of pyramidal lobe especially in patients requiring total thyroidectomy would decrease relapses that may occur later and thus facilitate the treatment and monitoring of patients. According to Sofia P et al, Pyramidal lobe was present in 43.5% of males and in 18.1% of female cadavers. Pyramidal lobe was frequently arising from the Isthmus. In this present study, the pyramidal lobe is observed in 17 cases (34%).

ONTOGENY From an embryological point of view, thyroid tissue appears on the 24th day at the limit between the first and second brachial arch. It appears initially as a thickening of the endodermic plaque at the floor of the pharyngeal rudiment and constitutes progressively as a sac or thyroid diverticulum. Initially loose, then diverticulum hardens progressively while the thyroid gradually migrates through the neck to reach its final position. Before reaching the final position, thyroid remains attached to the tongue with the help of thyroglossal duct. By the end of the seventh week of pregnancy, the thyroid has reached its position and adopted its adult form, losing its connection with the tongue, through duct degeneration, starting generally from its middle third, although the origin of thyroid primordium persists in the form of the foramen caecum of the tongue. During its descent, a portion of the thyroid tissue may persist along the axis of the thyroglossal duct or even continue the descent to the bottom. The remnants of thyroid tissue result in various anatomical anomalies including pyramidal lobe. It may be adherent to the hyoid bone by fibrous or muscular cords.

CONCLUSIONS
Pyramidal lobe is an accessory structure of thyroid. It may vary in shape and position as well as appearance and size. Its direction is upwards in the midline or slightly to the left or right, depending on the position of origin on the upper border of isthmus. It may be attached to the hyoid bone by fibromuscular tissue. The origin can be on upper border of isthmus, medial border of lateral lobes or the upper poles. Most of the authors claim that the most frequent position (40-60%) of the pyramidal lobe origin is the left side of the isthmus or the left lobe of thyroid gland. These statements agree with data from our study. Since the presence of pyramidal lobe is considered as normal component of thyroid gland, it should always be examined during surgery & mandatorily removed in total and subtotal thyroidectomies.

REFERENCES


