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Surgical Anatomy and variations of the Pyramidal Lobe of the Thyroid gland in patients undergoing Thyroidectomy

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Abstract
The Pyramidal Lobe (PL) is a thyroid tissue remnant of embryological origin located in the pretracheal region. Failure to excise the PL during thyroid surgeries will result in incomplete resection and it is important for the surgeon to be aware of its clinical anatomy. We attempt to study the incidence of the PL of the thyroid gland and its anatomical variations. Methods: This prospective study was carried out on 30 cases who underwent Total Thyroidectomy at the Department of ENT in a tertiary care centre in central India between April 2022 to June 2024. The study involved observing and documenting the incidence, anatomical variations in size and location of the PL during thyroid surgery. Results: PL was identified in 12 (40%) patients. PL was seen arising from the isthmus in 9 (75%) study subjects, in 2(16.66%) on right and in 1(8.33%) on left side. The length varied from 14mm to 24mm (mean length of PL 16.9 ± 3.3 mm). Conclusion: The Pyramidal Lobe is a frequently encountered normal anatomical variant of the thyroid gland. Failure to adequately address this anatomical structure may result in incomplete resection of the thyroid gland during surgeries and result in potential consequences such as recurrence or persistence of disease.

Keywords: Pyramidal Lobe, thyroidectomy, thyroid anatomy.

Introduction
The thyroid gland, the largest endocrine organ in the body, plays a critical role in regulating metabolic processes through its hormone production. The treatment of choice at present for thyroid malignancies, suspicious nodules and large goitres is Total Thyroidectomy. Surgical management of thyroid disorders and completeness of resection necessitates a thorough understanding of thyroid anatomy, including its anatomical variants. One such variation is the Pyramidal Lobe (PL), or the lobe of Lalouette[2], is a remnant of the thyroglossal tract, comprising of functional thyroid tissue and is present in 12–81%[1] of individuals. The PL exhibits significant variability in size, shape, and anatomical location. Its incomplete resection during thyroidectomy may compromise surgical outcomes, particularly in cases of malignancy, leading to disease persistence or recurrence. The PL is of great interest considering that it could be a source of pitfalls in the completeness of thyroid surgeries if it is not recognised and is left behind. Hence, the Pyramidal Lobe should be sought for and dissected meticulously during thyroid surgery.

Materials and Methods
This prospective study was carried out on 30 cases who underwent thyroid surgery at the Department of ENT in a Tertiary care centre in Central India between April 2022 to June 2024. The study involved observing and documenting the incidence and anatomical variations of the pyramidal lobe during thyroid surgery.
Inclusion criteria: Patients who needed total thyroidectomy for thyroid disease and were consenting for surgery.
Exclusion criteria: Patients who had undergone previous thyroid surgery were excluded. Patients below 12 years of age were also not included in the study.

Ethical approval for the study was obtained from the Institutional Ethics Committee and informed consent was obtained from all participants before their inclusion in the study.

All patients included in the study needing total thyroidectomy were evaluated by taking a detailed history, general examination, otolaryngological assessment and thyroid evaluation which included thyroid function tests, thyroid imaging and fine needle aspiration cytology.

Fitness for thyroidectomy under general anaesthesia was obtained after required investigations.

Tables and Figures

Table 1: Incidence Of Pyramidal Lobe Among Study Subject.

	No. of patients	%
Pyramidal lobe Present	12	40
Pyramidal lobe Absent	18	60

Table 2: Location Of Base of Pyramidal Lobe.

Location	n	(%)
Isthmus	9	75
Right lobe of thyroid	2	16.66
Left lobe of thyroid	1	8.33

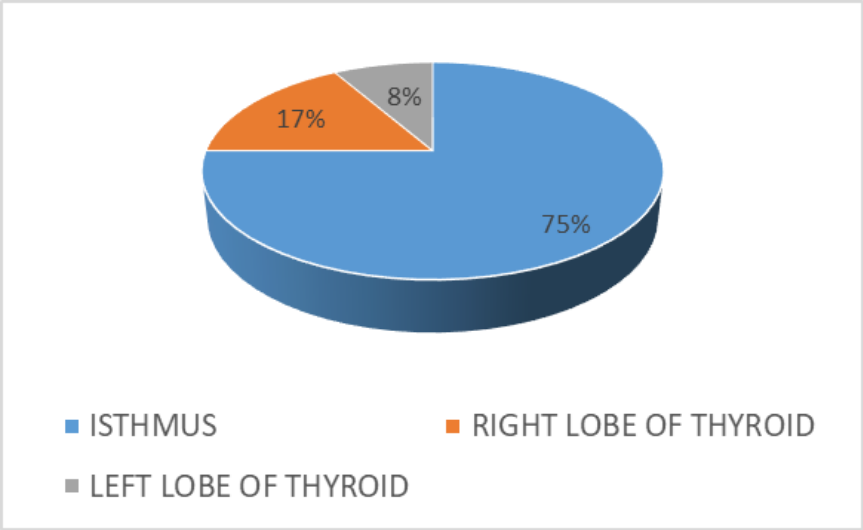

Fig. 1: Location Of Base of Pyramidal Lobe.

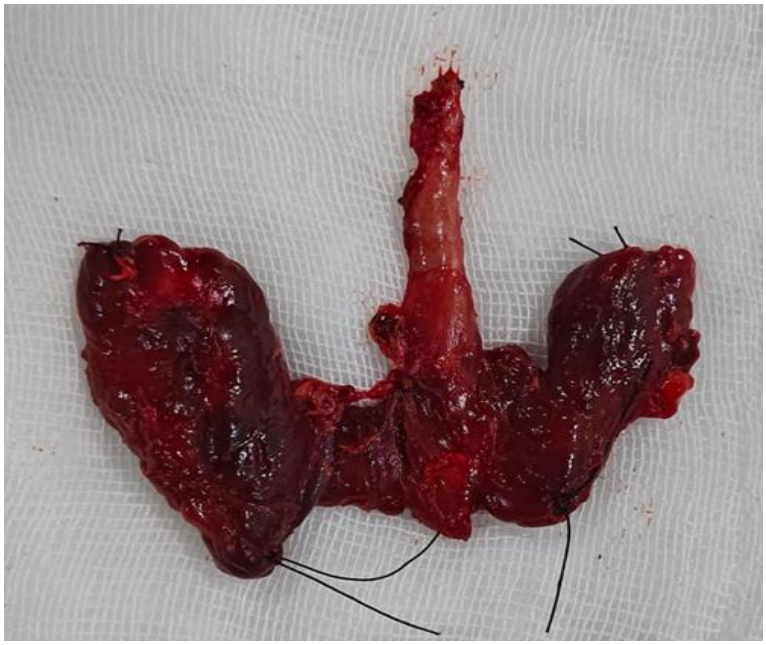

Fig. 2: Pyramidal Lobe in One of Our Study Subjects

Surgical technique: After taking skin incision, subplatysmal flaps were elevated and cervical fascia was divided in the midline. Strap muscles retracted to expose the thyroid gland. PL was looked for after delineating the superior

border of both lobes and the isthmus of the thyroid gland. If PL was found to be present, its location, side and length measured in situ by a rigid scale was recorded. Dissection of both the lobes was performed in a standard manner. The Pyramidal Lobe, if present, was traced in its entirety and removed along with the thyroid gland in toto.
The incidence of the PL was determined in patients who underwent total thyroidectomy.

Data Analysis
The Data was entered in MS Excel spreadsheet and analysis was done using Jamovi software version 2.3.28 solid. Data analysis involved the use of descriptive statistics to summarise demographics of the study subjects, intraoperative findings. The frequency and distribution of pyramidal lobe variations were analyzed. Categorical variables are presented in numbers and percentages. Continuous variables presented as Mean ± SD.

Results
Out of 30 subjects studied, maximum subjects were in the age group of 31- 40 years (36.66%). Mean age of presentation was 42.5 ± 14.4 years. 27 (90%) subjects were female, while 3 (10%) subjects were male. The most common indication for total thyroidectomy out of the 30 patients studied was colloid goitre which comprised of 16(53.33%) patients. This was followed by Follicular carcinoma in 5 (16.66%) and Papillary carcinoma in 4(13.3%) patients. The Pyramidal lobe was present in total 12(40%) patients. The pyramidal lobe as seen originating most commonly from the isthmus in 9 (75%) cases followed by right lobe of thyroid in 2(16.66%) and the left lobe of the thyroid in 1 (8.33%) of cases. The length of the pyramidal lobe found in our study varied from 14mm to 24mm.The mean length of pyramidal lobe is 16.9 ± 3.3 mm.

Discussion
The current study evaluated the incidence, anatomical variation, and clinical significance of the Pyramidal Lobe (PL) in 30 patients undergoing total thyroidectomy. The most common indication was colloid goitre, accounting for 53.33% of cases, followed by follicular carcinoma (16.66%) and papillary carcinoma (13.3%). The incidence of the PL was 40%, consistent with previous studies by Irawati et al (36.89%) and Mangalgiri et al (41.46%). The PL most frequently originated from the isthmus (75%), consistent with previous studies by Gurleyik et al and Zivic et al . The PL length in this study ranged from 14 to 24 mm, with a mean of 16.9 ± 3.3 mm, which is within the range of other studies, such as those by Gurleyik et al and Zivic et al. The variability in PL incidence, origin, and length underscores the importance of thorough intraoperative evaluation to ensure complete thyroid resection, particularly in cases of malignancy.

Conclusion
The significant incidence of the Pyramidal Lobe (40%), highlights the need for careful intraoperative assessment and meticulous dissection as leaving the Pyramidal Lobe behind may lead to persistence or recurrence of disease. The Pyramidal Lobe should be actively sought for and removed in order to achieve complete resection of the thyroid gland and aim for safer and effective surgeries.

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