

**Study of histopathological spectrum of neoplastic lesions of thyroid in a tertiary care hospital – 5 and half year study**

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**Abstract**

**Purpose/Aim:** Diseases of the thyroid gland comprise a spectrum of entities causing systemic disease or a localized abnormality in thyroid gland as nodular enlargement or a tumor mass. Thyroid carcinomas are the commonest endocrine cancers accounting for 90-93% of all endocrine malignancies.

The aim of this study was to highlight the spectrum of thyroid neoplastic lesions in thyroidectomy specimen.

**Materials and Methods:** This study was done in the Department of Pathology at medical college, Navi Mumbai from January 2018 to June 2023. The thyroidectomy specimens obtained were subjected to formalin fixation and paraffin embedding, stained with hematoxylin and eosin and studied.

The thyroid diseases were classified on histological grounds into non-neoplastic and neoplastic lesions and were further subclassified as benign and malignant as per the WHO histological classification of thyroid tumors.

**Results:** A total of 67 neoplastic lesions of thyroid were studied. The study showed definite female predominance.

24 cases were benign neoplastic lesions, 6 cases were low-risk neoplasms and 37 were malignant lesions. Papillary carcinoma of thyroid was the commonest malignant lesion while follicular adenoma was most common benign lesion.

**Conclusion:** Histopathological examination is gold standard in thyroid neoplasms. Definite histopathological diagnosis will be of great importance in determining further surgical management and prognosis of the patients

**Keywords:** Thyroid, neoplastic lesions, thyroid carcinoma, papillary carcinoma, follicular adenoma.

**Introduction**

Thyroid is one of the important endocrine organ, which plays vital physiological roles in body. The thyroid hormones are responsible for maintenance of homeostasis.

Disorders of thyroid include developmental, inflammatory, hyperplastic and neoplastic lesions.

They show wide disparity in incidence and histological pattern related to age, sex, dietary and environmental

factors. Goiter is major health concern encountered in clinical practice. For most of the lesions, a diagnosis can be reached by morphological assessment alone; so, the classification of various histomorphological features is important to categorize the lesions into benign and malignant tumors.

Thyroid cancer account for 1.5% of all cancers, but it is the commonest endocrine cancer accounting for 92% of all endocrine malignancies.

### Materials and Methods

This study was done in the Department of Pathology at Medical College, Navi Mumbai from January 2018 to June 2023, observational, retrospective study.

For each case, the laboratory request form and duplicate copy of the histological report were retrieved and relevant information such as age, sex and histological type of thyroid neoplasms are noted. The corresponding H&E slides were retrieved, reviewed and classified according to 2022 WHO classification.

Total 67 thyroidectomy (partial, subtotal, total and lobectomy) specimens obtained were subjected to formalin fixation and paraffin embedding, stained with hematoxylin and eosin and studied. Special stains and Immunohistochemistry studied done wherever required.

The neoplastic thyroid lesions are included in the study and non-neoplastic lesions were excluded.

### Observation and Results

#### Results

A total of 67 thyroid neoplastic specimens were received over a period of 5 and half years at Department of pathology at Medical College, Navi Mumbai. Mainly thyroid neoplastic lesions are adenomas and carcinomas. 86.6% cases were found to be females and 13.4% cases were males (Table:2) with Female : Male ratio 6.4:1.0. Among total of 67 neoplastic lesions, 24 were adenomas 34.8% out of which 19 cases were follicular adenoma

(28.4% ) and 5 cases were oncocytic adenoma (7.4%) (Table:4) . The relative peak age incidence for benign neoplastic thyroid lesions was seen in 31-40 years.

In this study 4 patients were diagnosed as non-invasive follicular neoplasm with papillary like features accounting for 6% of all neoplastic lesions and 2 patients were diagnosed as hyalinizing trabecular thyroid tumor accounting for 3% of all neoplastic lesions (Table4). Both the entities are considered as low-risk neoplasm according to WHO 2022 classification. Malignant thyroid lesions accounted to 55.3% of all thyroid neoplasms (Table: 3). The peak age of incidence in the age group of 31-40 years followed by 2<sup>nd</sup> highest peak in 21-30 years age group. The female to male ratio for malignant thyroid lesion was 5.1:1.0.

Papillary carcinoma was the commonest malignant tumor in this study seen in 47.7% (Table: 4) of all neoplastic lesions. Of these 26 cases were females and 6 cases were males. 2 cases of minimally invasive follicular variant of papillary thyroid carcinoma were diagnosed accounting for 3% of neoplastic lesions (Table:4).

Two cases (3%) were medullary carcinoma of thyroid and 1 case (1.5%) of poorly differentiated carcinoma encountered in this study (Table: 4).

Table 1: Age distribution of patients (n=67)

Age group (in yrs)	No. Of cases	Percentage %
<=20	3	4.5
21-30	17	25.4
31-40	26	38.7
41-50	12	17.9
51-60	6	9
61+	3	4.5
Total	67 Cases	100%

Table 2: Gender distribution of patients (n = 67)

Gender	Cases	Percentage %
Males	9	13.4
Females	58	86.6
Total	67	100%

Table 3: Distribution of neoplastic lesions (n=67)

Neoplasms	Cases	Percentage%
Benign	24	35.8
Intermediate (Low-Risk)	6	8.9
Malignant	37	55.3
Total	67 Cases	100%

Table 4: Histopathological Diagnosis of Neoplastic Lesions (n = 67)

	Histology Type	Cases	Percentage
Benign	Follicular adenoma	19	28.4
	Oncocytic adenoma	5	7.4
Intermediate	Hyalinizing trabecular thyroid tumor	2	3
	Non-invasive follicular thyroid neoplasm with papillary-like nuclear features	4	6
Malignant	Invasive encapsulated follicular variant papillary thyroid carcinoma (minimally	2	3

	invasive)		
	Papillary carcinoma of thyroid and its variants	32	47.7
	Medullary carcinoma of thyroid	2	3
	Poorly differentiated thyroid carcinoma	1	1.5
Total		67	100%

Fig. 1A & 1B: Follicular Adenoma

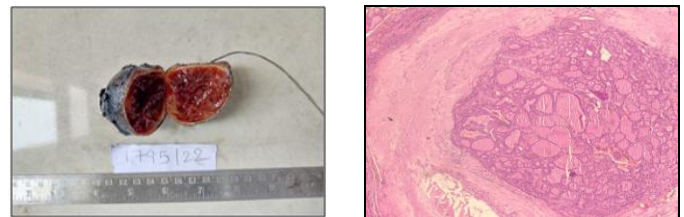


Fig. 2A & 2B: Papillary Carcinoma of Thyroid

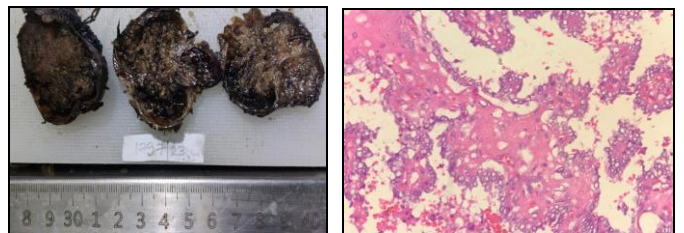


Fig. 3A & 3B: Diffuse Sclerosing Variant of Papillary Carcinoma of Thyroid

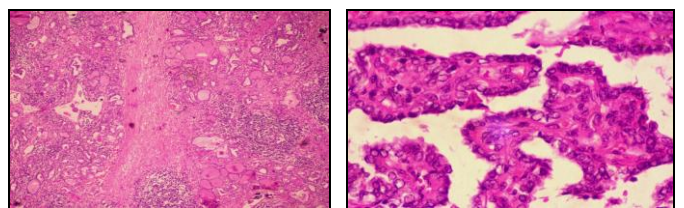


Fig. 4A & 4B: Medullary Carcinoma of Thyroid

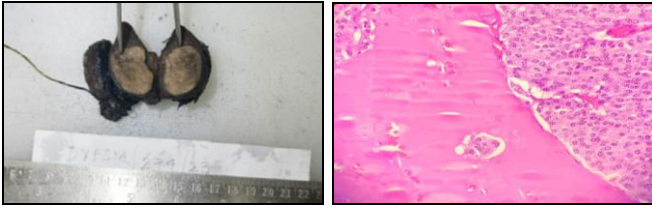
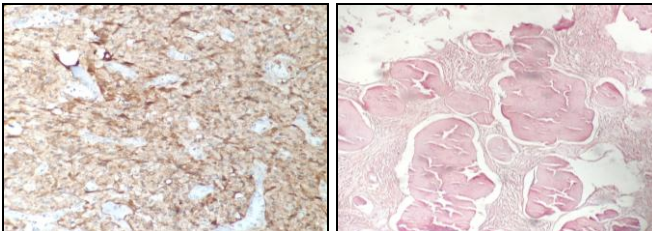


Fig. 5 & 6



### Legends Figure

Fig 1a (Left side): The cut surface of thyroid lobe shows solitary, well encapsulated cystic lesion.

Fig 1b (Right side): H & E: 100 x: Solitary lesion completely enveloped by the thick fibrous capsule. Lesion shows hyperplastic, closely packed follicles of varying patterns including macro follicles and micro follicles.

Fig 2a (Left side): The cut surface of thyroid lobe shows grey-brown tumor with papillary excrescences.

Fig. 2b (Right side): H&E: 400 xs: Tumor cells are arranged in papillae. Cells are round to oval with optically clear nuclear chromatin and eosinophilic cytoplasm. Few of the cells show nuclear grooving, crowding and overlapping.

Fig 3a (Left side): H&E: 40X: Lymphoid follicles, areas of fibrosis and islands of papillary carcinoma.

Fig 3b(Right side):H&E: 400X: Nuclear features of papillary thyroid carcinoma.

Fig 4a (Left side): The cut surface of thyroid lobe shows single, solid, grey-white, well circumscribed, nodular, encapsulated tumor.

Fig 4b (Right side):H&E:400X: Tumour cells are have round to oval nuclei with finely stippled to coarse

chromatin, indistinct nucleoli and scant to moderate amount of eosinophilic cytoplasm. Stroma shows eosinophilic a cellular amorphous homogenous material.

Fig 5 (Left side): IHC: Calcitonin- Diffuse cytoplasmic positivity (Medullary carcinoma of thyroid).

Fig 6 (Right side): Special Stain: Congo red positive (pink red appearance) (Medullary carcinoma of thyroid).

### Discussion

A total of 67 thyroidectomy specimens of neoplastic lesions which were studied for a duration of 5 and half years. In our present study, the age of the patients ranged from 18 years to 65 years. In our present study the commonest age group presenting with neoplastic thyroid disorders was in the 3th to 4th decade which was correlating with the study by Abdulkader et al<sup>6</sup> and Lateef et al<sup>10</sup>.

In the present study, it was observed that 58 (86.6%) cases were females and 9 (13.4%) cases were male. The female to male ratio found in this study was 6.4:1, which on comparison with the studies by Padmom L et al<sup>1</sup>, Abdulkareem et al<sup>2</sup>, Sudha et al<sup>5</sup>, Nzegwu et al<sup>3</sup>, and Nggada et al<sup>4</sup> were 6:1, 5.7:1, 7:1, 6:1 and 6.2:1 respectively and was favouring with our study. Among the 67 cases of the neoplastic thyroid lesions in this study, 19 cases (28.4%) are follicular adenomas which was correlating with Padmom L et al<sup>1</sup>and Prabha e al<sup>7</sup>. To differentiate a follicular adenoma from follicular carcinoma histopathological examination is mandatory. Papillary carcinoma was the most common malignant thyroid lesion and constituted 86.6% of the malignant lesions in our study. This observation was similar with the study of Gupta A et al<sup>8</sup>, Chukudebelu et al<sup>9</sup>, and Abdulkader et al<sup>6</sup>. Thus, the present study gives beneficial knowledge about the epidemiological and demographic variables in regard with the about various



neoplastic thyroid disorders on the basis of histopathology.

In the present study the neoplastic lesions of thyroid are classified according to 2022 WHO 5<sup>th</sup> edition.

In present study papillary carcinoma of thyroid was further sub typed on histopathology.

The various subtypes reported in the study were classic, infiltrative follicular, tall cell, columnar and diffuse Sclerosing. Tall cell and columnar cell subtypes are more frequently associated with aggressive nature of disease. Diffuse sclerosing subtype are often associated with nodal metastasis and locoregional recurrence (Christopher Juhlin C et al<sup>11</sup>).

NIFTPs are low risk neoplasms. They are well encapsulated and non-invasive neoplasm with RAS or codon 601 BRAF mutations (ChristoferJuhlin C et al<sup>11</sup>).

Invasive follicular variant of papillary thyroid carcinoma exhibit RAS driven mutations were as infiltrative follicular variant of papillary thyroid carcinoma exhibit BRAF driven mutations with florid nuclear atypia and invading the thyroid parenchyma, lymphatic vessels thus behaving like papillary carcinoma of thyroid.(ChristoferJuhlin C et al<sup>11</sup>).

BRAF driven papillary thyroid carcinoma patients have better prognosis compared to RAS driven papillary carcinoma of thyroid and overrepresentation of BRAF p.V600E driver mutations in specific PTC subtypes.(ChristoferJuhlin C et al<sup>11</sup>, Baloch et al<sup>12</sup>, Kebebew E et al<sup>13</sup>).

Other studies like Immunohistochemistry and molecular studies should be considered as they help in further classification, as well as to identify the mutation and give prompt treatment.

### Conclusion

Thyroid lesions are commonly encountered in routine clinical practice. They present with overlapping

symptoms aided by radiological investigations that help in giving differential diagnosis.

Histopathological examination gives a more definitive diagnosis in cases of midline neck swellings.

Hence, histopathological examination remains gold standard for thyroid lesions.

Definite histopathological diagnosis and molecular studies are of great importance in determining further surgical management and prognosis of the patients.

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