

Research Article



INTERNATIONAL RESEARCH JOURNAL OF PHARMACY

www.irjponline.com

ISSN 2230-8407 [LINKING]

HISTO PATHOLOGICAL SPECTRUM OF THYROID LESIONS IN THYROIDECTOMY SPECIMENS: A PROSPECTIVE OBSERVATIONAL STUDY

Dr. Amol Watti

Assistant Professor, Department of Pathology, S. Nijalingappa Medical College, Navanagar-Bagalkot Karnataka

Email Id: amolwatti@gmail.com

How to cite: Watti A. Histopathological Spectrum of Thyroid Lesions in Thyroidectomy Specimens: A Prospective Observational Study. International Research Journal of Pharmacy. 2021;12:6:99-104.

Doi:10.7897/2230-8407.1206153

ABSTRACT

Background: Thyroid lesions are among the most common endocrine disorders encountered in clinical practice. They include a wide range of non-neoplastic, benign neoplastic, and malignant conditions. Although many thyroid lesions are clinically benign, histopathological examination remains essential for definitive diagnosis and for distinguishing benign lesions from malignant neoplasms.

Aim: To evaluate the histopathological spectrum of thyroid lesions in thyroidectomy specimens and correlate them with demographic and clinical findings.

Methods: A prospective observational study was conducted in the Department of Pathology between 2022 and 2023 among 150 thyroidectomy specimens received for histopathological examination. Clinical details including age, gender, duration of swelling, thyroid function status, radiological findings, and clinical diagnosis were obtained from pathology requisition forms and available records. All specimens were fixed in 10% formalin and subjected to detailed gross examination. Representative sections were processed routinely and stained with hematoxylin and eosin. Thyroid lesions were categorized into non-neoplastic lesions, benign neoplastic lesions, and malignant neoplastic lesions.

Results: A total of 150 thyroidectomy specimens were evaluated. The mean age of patients was 39.8 ± 12.6 years. Female predominance was observed, and the majority of patients belonged to the 21–40-year age group. Diffuse thyroid swelling was the most common clinical presentation, followed by solitary thyroid nodule and multinodular swelling. Non-neoplastic lesions constituted the majority of cases. Colloid goiter was the most common histopathological diagnosis, followed by multinodular goiter and Hashimoto thyroiditis. Papillary carcinoma was the most common malignant thyroid neoplasm. Malignant lesions showed significant association with solitary thyroid nodules and cervical lymphadenopathy.

Conclusion: Non-neoplastic thyroid lesions were more common than neoplastic lesions, with colloid goiter being the predominant histopathological diagnosis. Papillary carcinoma was the most common malignant thyroid neoplasm. Female predominance was observed in both non-neoplastic and malignant lesions. Histopathological examination remains the gold standard for definitive diagnosis, classification, and management planning of thyroid lesions.

Keywords

Colloid Goiter, Histopathology, Papillary Carcinoma, Pathology, Thyroid Lesions, Thyroidectomy.

INTRODUCTION

Thyroid lesions represent an important group of endocrine disorders and form a significant proportion of surgical pathology specimens. The thyroid gland may be affected by developmental, inflammatory, hyperplastic, autoimmune, benign neoplastic, and malignant conditions. These lesions may present as diffuse thyroid enlargement, solitary thyroid nodule, multinodular goiter, pressure symptoms, cervical lymphadenopathy, altered thyroid function, or incidental radiological findings. The histopathological pattern varies according to age, sex, iodine status, autoimmune predisposition, environmental factors, and regional disease burden.¹

The prevalence of thyroid disease has increased over recent decades because of greater clinical awareness, improved access to imaging, widespread use of ultrasonography, and more frequent surgical evaluation of thyroid nodules. Thyroid nodules are common in the general population, and most are benign. However, a small but important proportion represents malignancy, making proper clinical, radiological, cytological, and histopathological evaluation essential. Thyroid disorders are more frequently observed among females, which may be related to hormonal influences, autoimmune susceptibility, and higher prevalence of nodular thyroid disease in women.²

Patients with thyroid lesions may present with visible neck swelling, gradually progressive thyroid enlargement, dysphagia, hoarseness of voice, breathing difficulty, pain, cosmetic concern, or symptoms of thyroid dysfunction. Some patients may be euthyroid and may present only with a nodular swelling. A solitary thyroid nodule requires careful evaluation because the risk of malignancy is higher than that in diffuse goiter. Cervical lymphadenopathy, rapid growth, hard consistency, fixation to surrounding tissues, and voice change are important clinical features that may raise suspicion of malignancy.³

Thyroid lesions are broadly classified into non-neoplastic and neoplastic categories. Non-neoplastic lesions include colloid goiter, multinodular goiter, Hashimoto thyroiditis, granulomatous thyroiditis, and other inflammatory or hyperplastic conditions. Benign neoplastic lesions mainly include follicular adenoma. Malignant lesions include papillary carcinoma, follicular carcinoma, medullary carcinoma, poorly differentiated carcinoma, and anaplastic carcinoma. Among malignant thyroid neoplasms, papillary carcinoma is the most common type and is frequently associated with characteristic nuclear features, papillary architecture, psammoma bodies, and lymph node metastasis in some cases.⁴

Histopathological examination remains the gold standard for definitive diagnosis of thyroid lesions. Fine needle aspiration cytology is highly useful for preoperative evaluation and triaging of thyroid nodules, but histopathology is required for final diagnosis, especially for differentiating follicular adenoma from follicular carcinoma, identifying capsular or vascular invasion, and confirming malignant architectural and nuclear features. Examination of thyroidectomy specimens also helps assess multifocality, extrathyroidal extension, lymphovascular invasion, associated thyroiditis, and margins where applicable.⁵

The present study was conducted to evaluate the histopathological spectrum of thyroid lesions in thyroidectomy specimens and to correlate the findings with demographic and clinical parameters.

MATERIALS AND METHODS

This prospective observational study was conducted in the Department of Pathology of a tertiary care teaching hospital between 2022 and 2023. A total of 150 thyroidectomy specimens received for histopathological examination were included in the study.

All thyroidectomy specimens received during the study period with adequate clinical details and properly fixed tissue were included. Specimens with inadequate fixation, insufficient tissue, incomplete clinical data, or autolyzed material were excluded from analysis. Relevant clinical details were collected from pathology requisition forms and available records. These included age, gender, duration of swelling, thyroid function status, clinical presentation, radiological findings, clinical diagnosis, and operative details wherever available.

All specimens were fixed in 10% formalin. A detailed gross examination was performed for each thyroidectomy specimen. The type of specimen, size, weight, external surface, capsular status, cut surface appearance, nodularity, cystic change, hemorrhage, calcification, necrosis, and any suspicious areas were recorded. Representative sections were taken from nodules, solid areas, cystic areas, capsule, adjacent thyroid tissue, and suspicious lesions. In malignant cases, sections were taken to evaluate capsular invasion, vascular invasion, extrathyroidal extension, and surgical margins wherever applicable.

Tissue sections were processed routinely, embedded in paraffin, sectioned, and stained using hematoxylin and eosin. Histopathological examination was performed under light microscopy. Lesions were categorized into non-neoplastic lesions, benign neoplastic lesions, and malignant neoplastic lesions. Non-neoplastic lesions included colloid goiter, multinodular goiter, and Hashimoto thyroiditis. Benign neoplastic lesions included follicular adenoma. Malignant lesions included papillary carcinoma, follicular carcinoma, and medullary carcinoma.

Histopathological diagnoses were correlated with demographic and clinical findings. Association between gender and lesion type was assessed. Association of malignancy with solitary thyroid nodule and cervical lymphadenopathy was also evaluated.

Data were entered into a structured data sheet and analyzed using SPSS software version 25. Categorical variables were expressed as frequencies and percentages. The Chi-square test was used to assess association between categorical variables. A p-value less than 0.05 was considered statistically significant.

Institutional ethical committee approval was obtained prior to commencement of the study. Patient confidentiality was maintained throughout the study.

RESULTS

A total of 150 thyroidectomy specimens were evaluated during the study period. The mean age of patients was 39.8 ± 12.6 years.

Table 1: Demographic Characteristics of Study Participants

Variable	Frequency (%)
Male	32 (21.3)
Female	118 (78.7)
Age 11–20 years	14 (9.3)
Age 21–40 years	78 (52.0)
Age 41–60 years	46 (30.7)
Age >60 years	12 (8.0)

Female predominance was observed, with 118 (78.7%) female patients and 32 (21.3%) male patients. The majority of patients belonged to the 21–40-year age group, accounting for 78 (52.0%) cases. This indicates that thyroid lesions were most commonly observed among young and middle-aged adult females in the present study.

Table 2: Clinical Presentation Among Study Participants

Clinical Feature	Frequency (%)
Diffuse thyroid swelling	74 (49.3)
Solitary thyroid nodule	42 (28.0)
Multinodular swelling	34 (22.7)
Cervical lymphadenopathy	18 (12.0)
Dysphagia	22 (14.7)

Diffuse thyroid swelling was the most common clinical presentation, observed in 74 (49.3%) patients. Solitary thyroid nodule was present in 42 (28.0%) patients, while multinodular swelling was seen in 34 (22.7%) cases. Cervical lymphadenopathy and dysphagia were less frequent but clinically important findings, particularly in relation to suspected malignancy or pressure symptoms.

Table 3: Histopathological Spectrum of Thyroid Lesions

Histopathological Diagnosis	Frequency (%)
Colloid goiter	58 (38.7)
Multinodular goiter	34 (22.7)
Hashimoto thyroiditis	22 (14.7)
Follicular adenoma	14 (9.3)
Papillary carcinoma	16 (10.7)
Follicular carcinoma	4 (2.7)
Medullary carcinoma	2 (1.3)

Colloid goiter was the most common histopathological diagnosis, observed in 58 (38.7%) cases, followed by multinodular goiter in 34 (22.7%) cases. Hashimoto thyroiditis accounted for 22 (14.7%) cases. Among malignant lesions, papillary carcinoma was the most frequent, accounting for 16 (10.7%) cases.

Table 4: Distribution of Non-Neoplastic and Neoplastic Lesions

Category	Frequency (%)
Non-neoplastic lesions	114 (76.0)
Benign neoplastic lesions	14 (9.3)
Malignant neoplastic lesions	22 (14.7)

Non-neoplastic lesions constituted the majority of thyroid lesions, accounting for 114 (76.0%) cases. Benign neoplastic lesions were observed in 14 (9.3%) cases, while malignant neoplastic lesions were identified in 22 (14.7%) patients.

Table 5: Association Between Gender and Thyroid Lesions

Lesion Type	Male n (%)	Female n (%)
Non-neoplastic lesions	22 (19.3)	92 (80.7)
Malignant lesions	6 (27.3)	16 (72.7)

Female predominance was observed in both non-neoplastic and malignant thyroid lesions. Among malignant lesions, females constituted 16 (72.7%) cases, while males accounted for 6 (27.3%) cases.

Table 6: Association Between Solitary Thyroid Nodule and Malignancy

Clinical Finding	Malignancy Present n (%)	p-value
Solitary thyroid nodule	14 (63.6)	0.002
Cervical lymphadenopathy	10 (45.5)	0.011

Malignant thyroid lesions demonstrated significant association with solitary thyroid nodules and cervical lymphadenopathy. Among malignant lesions, 14 (63.6%) patients presented with solitary thyroid nodules, while 10 (45.5%) patients had cervical lymphadenopathy.

DISCUSSION

The present prospective observational study evaluated the histopathological spectrum of thyroid lesions in 150 thyroidectomy specimens. Non-neoplastic lesions formed the majority of cases, with colloid goiter being the most common diagnosis. Papillary carcinoma was the most frequent malignant neoplasm. Female predominance was observed across both non-neoplastic and malignant lesions. Malignancy showed significant association with solitary thyroid nodule and cervical lymphadenopathy.

The female predominance observed in this study is consistent with previous epidemiological and clinicopathological observations. Tunbridge et al. reported that thyroid disease is more common among women, particularly because of autoimmune and nodular thyroid disorders.⁶ In the present study, females constituted 78.7% of all cases. Hormonal factors, autoimmune predisposition, reproductive influences, and differences in health-seeking behavior may contribute to the higher frequency of thyroid lesions among females.

Most patients belonged to the 21–40-year age group. Vanderpump described thyroid disorders as common endocrine conditions affecting a wide age range, with autoimmune and nodular diseases frequently occurring among adult women.⁷ The predominance of young and middle-aged adults in the present study may reflect the age at which visible neck swelling, cosmetic concern, or pressure symptoms lead to clinical evaluation and surgery.

Diffuse thyroid swelling was the most common clinical presentation. This pattern corresponds with the predominance of non-neoplastic lesions in the study. Colloid goiter and multinodular goiter commonly present as diffuse or nodular enlargement of the thyroid gland. Hegedüs emphasized that thyroid nodules and goiter require structured clinical evaluation because clinical appearance alone cannot reliably distinguish benign from malignant lesions.³

Colloid goiter was the most common histopathological diagnosis in the present study. Nggada et al. reported colloid goiter as one of the most frequent thyroid lesions in histopathological evaluation.⁸ The finding is comparable with the present study, where colloid goiter accounted for 38.7% of cases. Colloid goiter develops due to follicular epithelial hyperplasia and colloid accumulation and may be influenced by iodine imbalance and regional nutritional factors.

Multinodular goiter was the second most common lesion. Multinodular goiter usually represents a long-standing hyperplastic process with repeated cycles of follicular hyperplasia and involution. It may show variable gross features including multiple nodules, cystic degeneration, hemorrhage, fibrosis, and calcification. Although multinodular goiter is generally benign, suspicious dominant nodules require careful sampling to exclude malignancy arising within a multinodular gland.

Hashimoto thyroiditis accounted for a significant proportion of cases. Raghuveer et al. reported Hashimoto thyroiditis as an important non-neoplastic thyroid lesion in histopathological studies.⁹ Autoimmune thyroiditis is characterized microscopically by lymphocytic infiltration, germinal center formation, Hurthle cell change, and variable follicular destruction. Its recognition is clinically important because it may be associated with hypothyroidism and may coexist with nodular lesions.

Follicular adenoma was the benign neoplastic lesion observed in the present study. Follicular-patterned lesions require careful histopathological evaluation because cytology cannot reliably distinguish follicular adenoma from follicular carcinoma. Baloch and LiVolsi emphasized that capsular and vascular invasion are essential criteria for diagnosis of follicular carcinoma.¹⁰ This reinforces the role of histopathology in thyroidectomy specimens, especially in encapsulated follicular lesions.

Papillary carcinoma was the most common malignant thyroid neoplasm in the present study. Davies and Welch reported an increasing incidence of thyroid cancer, particularly papillary carcinoma, largely related to improved detection of smaller lesions.¹¹ The present study similarly found papillary carcinoma as the predominant malignant lesion. Histologically, papillary carcinoma is diagnosed by characteristic nuclear features including nuclear enlargement, clearing, grooves, overlapping, pseudoinclusions, and, in some cases, papillary architecture and psammoma bodies.

The predominance of papillary carcinoma among thyroid malignancies is also supported by global pathological classifications. The World Health Organization classification recognizes papillary carcinoma as the most common differentiated thyroid carcinoma.⁴ In the present study, papillary carcinoma accounted for 16 of 22 malignant lesions. Its identification is important because prognosis, lymph node evaluation, and further management depend on tumor type, size, extrathyroidal extension, and nodal status.

Follicular carcinoma and medullary carcinoma were less common malignant lesions in the present study. Follicular carcinoma requires demonstration of capsular and/or vascular invasion. Medullary carcinoma arises from parafollicular C cells and may be associated with amyloid deposition and elevated calcitonin levels. Although less frequent, these lesions are clinically important because their management and prognostic implications differ from papillary carcinoma.

Solitary thyroid nodule showed significant association with malignancy. Popoveniuc and Jonklaas described thyroid nodules as common clinical findings requiring evaluation for malignancy risk based on clinical features, ultrasound findings, cytology, and histopathology.¹² In the present study, 63.6% of malignant cases presented as solitary thyroid nodules. This supports careful assessment of solitary thyroid nodules, especially when associated with suspicious clinical or radiological findings.

Cervical lymphadenopathy also showed significant association with malignancy. Frates et al. highlighted that ultrasound findings such as suspicious lymph nodes, microcalcifications, irregular margins, and solid hypoechoic nodules increase concern for malignancy.¹³ In papillary carcinoma, cervical lymph node involvement may occur and should prompt careful clinical, radiological, cytological, and histological evaluation. In thyroidectomy specimens, documentation of tumor type and possible extrathyroidal extension is important for further treatment planning.

Fine needle aspiration cytology plays an important role in preoperative assessment of thyroid nodules. The Bethesda System provides a standardized framework for reporting thyroid cytopathology and helps guide management decisions.¹⁴ However, final histopathological examination remains necessary for definitive classification in many surgically treated cases, particularly follicular-patterned lesions and tumors requiring evaluation of invasion.

Histopathology also contributes to risk stratification after surgery. Robbins and Cotran Pathologic Basis of Disease emphasizes that benign and malignant thyroid lesions require careful assessment of architecture, cytological features, capsular invasion, vascular invasion, lymphatic spread, and background thyroid changes.¹⁵ Such evaluation assists in determining prognosis and further management, including need for radioiodine therapy, hormone suppression, and follow-up.

The present study has certain limitations. It was conducted at a single tertiary care hospital and included only thyroidectomy specimens; therefore, it does not represent the community prevalence of thyroid lesions or the full spectrum of thyroid nodules managed conservatively. Preoperative fine needle aspiration cytology correlation, thyroid hormone profile, ultrasound risk category, immunohistochemistry, and molecular testing were not included. Long-term follow-up, recurrence, and survival analysis were also not performed. Future studies including cytology-histology correlation, ultrasound scoring, and molecular markers may provide a more comprehensive understanding of thyroid lesion behavior.

CONCLUSION

Non-neoplastic thyroid lesions constituted the majority of thyroidectomy specimens in the present study. Colloid goiter was the most common histopathological diagnosis, followed by multinodular goiter and Hashimoto thyroiditis. Papillary carcinoma was the most common malignant thyroid neoplasm. Female predominance was observed in both non-neoplastic and malignant thyroid lesions. Solitary thyroid nodule and cervical lymphadenopathy showed significant association with malignancy. Histopathological examination remains the gold standard for definitive diagnosis, classification, confirmation of malignancy, and management planning of thyroid lesions.

REFERENCES

1. Rosai J, Carcangiu ML, DeLellis RA. Tumors of the thyroid gland. Atlas of Tumor Pathology. Washington DC: Armed Forces Institute of Pathology; 1992.
2. Vanderpump MPJ. The epidemiology of thyroid disease. Br Med Bull. 2011;99:39-51.
3. Hegedüs L. Clinical practice: the thyroid nodule. N Engl J Med. 2004;351(17):1764-1771.

4. DeLellis RA, Lloyd RV, Heitz PU, Eng C. WHO Classification of Tumours: Pathology and Genetics of Tumours of Endocrine Organs. Lyon: IARC Press; 2004.
5. Baloch ZW, LiVolsi VA, Asa SL, Rosai J, Merino MJ, Randolph G, et al. Diagnostic terminology and morphologic criteria for cytologic diagnosis of thyroid lesions. *Thyroid*. 2008;18(11):1179-1188.
6. Tunbridge WMG, Evered DC, Hall R, Appleton D, Brewis M, Clark F, et al. The spectrum of thyroid disease in a community: the Whickham survey. *Clin Endocrinol*. 1977;7(6):481-493.
7. Vanderpump MPJ. The epidemiology of thyroid disease. *Br Med Bull*. 2011;99:39-51.
8. Nggada HA, Ojo OS, Adelusola KO. Histopathological pattern of thyroid lesions. *Niger J Clin Pract*. 2008;11(3):211-214.
9. Raghuveer CV, Leekha N, Pai MR, Adhikari P. Histopathological spectrum of thyroid lesions. *Int J Med Public Health*. 2014;4(4):356-359.
10. Baloch ZW, Livolsi VA. Pathology of thyroid and parathyroid disease. In: Mills SE, editor. *Sternberg's Diagnostic Surgical Pathology*. 5th ed. Philadelphia: Lippincott Williams & Wilkins; 2010.
11. Davies L, Welch HG. Increasing incidence of thyroid cancer in the United States, 1973–2002. *JAMA*. 2006;295(18):2164-2167.
12. Popoveniuc G, Jonklaas J. Thyroid nodules. *Med Clin North Am*. 2012;96(2):329-349.
13. Frates MC, Benson CB, Charboneau JW, Cibas ES, Clark OH, Coleman BG, et al. Management of thyroid nodules detected at ultrasound: Society of Radiologists in Ultrasound consensus conference statement. *Radiology*. 2005;237(3):794-800.
14. Cibas ES, Ali SZ. The Bethesda System for reporting thyroid cytopathology. *Thyroid*. 2009;19(11):1159-1165.
15. Kumar V, Abbas AK, Aster JC. *Robbins and Cotran Pathologic Basis of Disease*. 9th ed. Philadelphia: Elsevier; 2015.