

Study of Correlation of Clinical Findings and Operative Findings in Thyroid Swellings: A Retrospective Hospital-based Study

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ABSTRACT

Introduction: Clinical evaluation plays an important role in diagnosing thyroid malignancy. However, it is largely dependent on the experience of the clinician to have an index of suspicion to detect malignancy and to channel further investigations. Not many studies have been done to signify the use of clinical and intraoperative findings in predicting thyroid malignancy.

Objective: The objective of the article was to study the correlation of clinical findings and operative findings in thyroid swellings with histopathological examination (HPE) reports in the Northeastern Indian population in a tertiary care hospital.

Materials and methods: The retrospective cohort study was conducted in the department of otorhinolaryngology (ENT). Case records of patients who visited department of ENT with thyroid swellings in the year 2017–2020 were included in the study.

Results: A total of 67 patients were included in the study. Clinically, the most common diagnosis was solitary thyroid nodule (STN) made in 54 (81%) patients. In our study, the clinical examination had a sensitivity of 83%, specificity of 32%, positive predictive value (PPV) of 59%, and negative predictive value (NPV) of 63% in diagnosing thyroid malignancy. The intraoperative assessment had a sensitivity of 100%, specificity of 20%, PPV of 59%, and NPV of 100% in diagnosing thyroid malignancy.

Conclusion: Clinical evaluation forms the foundation stone for further evaluation of thyroid disorders. Even though a lot of advancements have been made in management of thyroid disorders, clinical evaluation should not be overlooked. With clinical examination having a sensitivity of 83% and NPV of 63% and intraoperative assessment having a sensitivity of 100% and NPV of 100%, it helps in ruling out thyroid malignancy in our study population. However, studies with a large sample size are required to further validate the statement.

Clinical significance: Due importance should be given to high-risk clinical and intraoperative features for early diagnosis of thyroid cancer in any population.

Keywords: Assessment, Biopsy, Clinical skill, Goiter, Retrospective studies, Risk, Thyroid neoplasms, Thyroid nodule.

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INTRODUCTION

Thyroid swellings are common in adults and are clinically palpable in almost 3–7% of the population.^{1,2} The prevalence increases when ultrasonography (USG) is used and it can be detected in up to 70% of the population.^{1,3} Clinical evaluation precedes any further investigation to detect malignancy. Hence, clinical evaluation plays an important role in diagnosing thyroid malignancy. Clinical evaluation may also point towards malignancy and can correlate with intraoperative findings. However, it is largely dependent on the experience of the clinician to have an index of suspicion to detect malignancy and to channel further investigations. Clinical evaluation alone may not facilitate adequate examination of all the involved lobes or in cases with a significant retrosternal extension.

Not many studies have been done to signify the use of clinical and intraoperative findings in predicting thyroid malignancy. Clinical evaluation may not be highly sensitive and specific when used alone.⁴ It may not correlate with operative findings all the time. This study evaluates the correlation of clinical findings and operative findings in thyroid swellings in the Northeastern Indian population in a tertiary care hospital.

OBJECTIVE

The objective of the article was to study the correlation of clinical findings and operative findings in thyroid swellings with

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histopathological examination (HPE) reports in a tertiary care hospital.

MATERIALS AND METHODS

The retrospective cohort study was conducted in the department of otorhinolaryngology. Case records of patients who visited the department of ENT with thyroid swellings in the year 2017–2020 were included in the study.

Inclusion Criteria

- Case records of patients who visited department of ENT with thyroid swellings in the year 2017–2020.
- Case records of both genders belonging to all age groups who fulfill the above criteria.

Exclusion Criteria

- Case records of patients who do not have HPE reports.
- Case records of patients who had non-thyroidal neck swellings.

Withdrawal Criteria

Not applicable.

After obtaining the institutional ethics committee approval and in accordance with the Declaration of Helsinki, the case records of patients that satisfy the inclusion criteria were selected. The details of the patients like age, gender, clinical findings including history and examination, clinical diagnosis, duration of disease, fine needle aspiration cytology report, type of surgery done, and HPE report were collected. Data collection of clinical features and intraoperative features were done with blinding from the final HPE diagnosis. The presence of stridor, hoarseness of voice, neck nodes, dysphagia, rapid progression, reduced mobility, and skin involvement were considered as high-risk clinical features. The clinical findings and the operative findings were correlated with that of HPE in detecting thyroid malignancy. The HPE report was considered as the gold standard. Data collection was done in Microsoft Excel 2017, and data analysis was done using IBM PASW Statistics v19.0 (SPSS version 19.0). The sensitivity, specificity, positive predictive value (PPV), and negative predictive value (NPV) were studied for clinical findings and operative findings in detecting thyroid malignancy and were reported with 95% confidence interval (CI). All the statistical tests were considered statistically significant with a *p*-value of less than or equal to 0.05.

RESULTS

A total of 67 patients were included in the study. The minimum age of the study population was 12 years and the maximum age was 70 years with Mean ± S.D. = 39 ± 13 years. Male patients constituted 9 (13%) and female patients 58 (87%). The minimum duration of disease was 1 month and the maximum duration of disease was 240 months with the mean ± S.D. being 43.46 ± 45.49 months. Sixteen (24%) patients had history of neck swelling for less than a year. Thirty-seven (55%) patients had history for 1–5 years. Eleven (16%) patients had swelling for 6–10 years, and three (5%) patients had history for 11–20 years. Clinically, the most common diagnosis was solitary thyroid nodule (STN) made in 54 (81%) patients. Thyroid malignancy was initially diagnosed in two (3%) patients. It was diagnosed when one had palpable neck nodes and the other patient presented with stridor. After considering other high-risk clinical features in STN, clinical diagnosis of possible thyroid malignancy was made in a total of 17 (25%) patients. HPE revealed papillary thyroid cancer (PTC) as the most common diagnosis in 28 (42%) followed by multinodular goiter (MNG) in 17 (25%) patients (Table 1).

The diagnosis of malignant thyroid disease by clinical assessment, intraoperative assessment, and HPE was made in 17 (25%), 6 (9%), and 31 (46%) patients, respectively (Table 2).

Various clinical features were analyzed and their relation to diagnosis of malignant disease is depicted in Table 3. High-risk clinical features were seen in 17 (25%) patients. Firm consistency of the thyroid swelling was seen in 51 (76%) patients, out of which

Table 1: Various diagnoses made in our study

<i>Clinical and histopathological diagnoses</i>			
<i>Clinical diagnosis</i> <i>N = 67</i>	<i>n</i>	<i>Histopathological diagnosis</i> <i>N = 67</i>	<i>n</i>
STN	54 (81%)	Colloid goiter	10 (15%)
		MNG	17 (25%)
MNG	10 (15%)	Hashimoto's thyroiditis	2 (3%)
		Follicular adenoma	7 (10.5%)
MNG with retrosternal extension	1 (1%)	Papillary thyroid cancer	28 (42%)
		Medullary thyroid cancer	1 (1.5%)
Thyroid malignancy	2 (3%)	Follicular thyroid cancer	1 (1.5%)
		Anaplastic thyroid cancer	1 (1.5%)

Table 2: Benign and malignant diagnoses made by different modalities

<i>(N = 67)</i>	<i>Benign n (%)</i>	<i>Malignant n (%)</i>
Clinical assessment	50 (75%)	17 (25%)
Intraoperative assessment	61 (91%)	6 (9%)
HPE	36 (54%)	31 (46%)

28 patients had HPE malignancy. This finding was statistically significant with a *p*-value of 0.021 (Table 3).

Right hemithyroidectomy (RHT) was performed in 23 (34%) patients, and left hemithyroidectomy (LHT) was done in 13 (19%) patients. Subtotal thyroidectomy (STT) was done in three (5%) patients. Total thyroidectomy (TT) was performed in 18 (27%) patients and TT with neck dissection (ND) in 10 (15%) patients.

Intraoperatively, right lobe was commonly involved in 30 (45%), left lobe in 20 (30%), and bilateral lobe in 17 (25%) patients. Various intraoperative findings were analyzed and their relation to diagnosis of malignant disease is depicted in Table 4. Intraoperatively, the presence of extrathyroidal extension (ETE) was seen in four (6%) patients and neck nodes in four (6%) patients. This relationship was statistically significant with a *p*-value of 0.041. The intraoperative diagnosis of thyroid malignancy was done in six (9%) patients, out of which all six patients had HPE malignancy. This relationship was statistically significant with a *p*-value of 0.007 (Table 4).

In our study, the clinical examination had a sensitivity of 83%, specificity of 32%, PPV of 59%, and NPV of 63% in diagnosing thyroid malignancy. The intraoperative assessment had a sensitivity of 100%, specificity of 20%, PPV of 59%, and NPV of 100% in diagnosing thyroid malignancy in our study population.

DISCUSSION

Thyroid disorders are common worldwide with the presentations varying from functional disorders, structural disorders, and systemic disorders. The history of thyroid disease dates back to 2700 BC when seaweed was suggested for treatment of goiter. The first description of thyroidectomy was given by Abul Kasim in 961 AD; however, thyroidectomy was infamous till the late 19th century when ET Kocher introduced safe techniques for the resection of thyroid gland.⁵ Clinical evaluation was the main reason for the evolution of thyroid disease management. It forms the initial and most important stage in thyroid disease management. It is entirely dependent on the clinician's acumen and hence a sound knowledge of the thyroid disease, and the local prevalence of thyroid disease is vital. The goal



Table 3: Analysis of clinical features of thyroid swellings in our study population

Clinical features (N = 67)	n	HPE benign n = 36 (54%)	HPE malignant n = 31 (46%)	Test	p value
Age in years					
10–20	5	1 (20%)	4 (80%)	Fisher's exact	0.267
21–30	16	8 (50%)	8 (50%)		
31–40	14	7 (50%)	7 (50%)		
41–50	22	14 (64%)	8 (36%)		
51–60	6	5 (83%)	1 (17%)		
>60	4	1 (25%)	3 (75%)		
Gender					
Male	9	3 (33%)	6 (67%)	Fisher's exact	0.284
Female	58	33 (57%)	25 (43%)		
Duration of disease					
<1 year	16	8 (50%)	8 (50%)	Fisher's exact	0.186
1–5 year	37	17 (46%)	20 (54%)		
6–10 years	11	8 (73%)	3 (27%)		
11–20 years	3	3 (100%)	0		
Pain	3	3 (100%)	0	Fisher's exact	0.453
Rapid progression	7	3 (43%)	4 (57%)		
Dysphagia	5	2 (40%)	3 (60%)		
Hypothyroidism	1	1 (100%)	0		
Stridor	1	0	1 (100%)		
Retrosternal extension	1	1 (100%)	0		
Hoarseness of voice	2	0	2 (100%)	Fisher's exact	0.210
Reduced mobility	1	0	1 (100%)	Fisher's exact	0.463
Neck nodes	3	0	3 (100%)	Fisher's exact	0.094
Clinical size of swelling					
≤2 cm	4	1 (25%)	3 (75%)	Fisher's exact	0.219
2–4 cm	19	9 (47%)	10 (53%)		
5–10 cm	42	25 (60%)	17 (40%)		
11–20 cm	2	1 (50%)	1 (50%)		
Consistency					
Cystic	15	12 (80%)	3 (20%)	Chi-square	0.021
Firm	51	23 (45%)	28 (55%)		
Surface of swelling				Fisher's exact	0.729
Smooth	33	19 (58%)	14 (42%)		
Nodular	33	16 (49%)	17 (51%)		
High risk clinical features	17	7 (41%)	10 (59%)	Chi-square	0.269
Clinical benign/malignant					
Benign	51	30 (59%)	21 (41%)	Chi-square	0.160
Malignant	16	6 (38%)	10 (63%)		

Bold value indicates significant p-value of <0.05

was to identify the disease early with timely management and early identification of thyroid cancer.

Nix et al. published review papers which found out that asymptomatic thyroid nodule is the commonest presentation of thyroid malignancy.⁶ However, some notorious features when present can point toward thyroid malignancy. Commonly described features are pain, rapid increase in size, hoarseness of voice, more lateral neck swelling, dysphagia, skin ulceration, reduced mobility of the swelling, past history of radiation exposure, etc.^{1,7} However, not all these features are specific for malignancy. Hence, the sensitivity and specificity of clinical examination vary widely in diagnosing thyroid malignancy.

The world's biggest goiter belt is located in the Sub-Himalayan belt that extends from Kashmir in the north to Nagaland in the east.⁸ Our study was conducted encompassing the Northeastern

Indian population. In our study, the age of the youngest patient was 12 years and the age of the oldest patient was 70 years. In another retrospective study by Pasha, the youngest and oldest patients' ages were 9 and 85 years, respectively.⁹

Female patients constituted 87% of the study population. Similar findings have been reported in other studies. Raniwala et al. described female patients constituting 85% of their study population.¹⁰ Female patients constituted 91% in a study conducted by Al-Sharafi et al.¹¹ Rapid progression of swelling is considered as an ominous sign. However, rapid progression with pain is usually seen in hemorrhage into a colloid cyst. In our study, 16 (24%) patients had history of swelling for less than a year and 37 (55%) patients had history for 1–5 years. A similar finding was noted by Raniwala et al. with 50% of patients having symptoms for 1–7 years and 28.3% of patients having symptoms for less than a year.¹⁰

Table 4: Analysis of operative findings of thyroid swellings in our study population

<i>Operative findings (N = 67)</i>	<i>n</i>	<i>HPE benign n = 36 (54%)</i>	<i>HPE malignant n = 31 (46%)</i>	<i>Test</i>	<i>p value</i>
Intraop size of swelling					
≤2 cm	2	2 (20%)	4 (80%)	Fisher's exact	0.425
2–4 cm	13	8 (62%)	5 (38%)		
5–10 cm	52	26 (50%)	26 (50%)		
Surface of swelling					
Smooth	35	19 (54%)	16 (46%)	Fisher's exact	1.000
Nodular	32	17 (53%)	15 (47%)		
ETE	4	0	4 (100%)	Fisher's exact	0.041
Neck nodes	4	0	4 (100%)	Fisher's exact	0.041
Operative benign/malignant					
Benign	61	36 (59%)	25 (41%)		0.007
Malignant	6	0	6 (100%)	Fisher's exact	

Bold value indicates Significant *p* value of <0.05; Intraop, intraoperative; ETE, extrathyroidal extension

In our study, the symptoms of pain, rapid progression, dysphagia, hypothyroidism, stridor, retrosternal extension, hoarseness of voice, reduced mobility, neck nodes, size of the swelling, and surface of the swelling did not have a statistically significant association with diagnosis of thyroid malignancy. This may be due to the relatively small size of the study population. Consistency of the swelling had a significant association with diagnosing thyroid malignancy. In our study, dysphagia was seen in five (7.4%) patients. Durante et al. reported that dysphagia can be seen in up to 62% of patients with thyroid nodules, especially in left lobe lesions causing esophageal compression.⁷

In our study, the most common clinical diagnosis made was STN in 54 (81%) and clinical diagnosis of thyroid malignancy was made in 2 (3%) patients. Gautam et al. in their study diagnosed STN clinically in 55 (91.6%) patients, MNG in 2 (3%) patients, and possible malignancy in 1 (1.6%) patient.¹²

In our study, the most common HPE diagnosis was PTC as seen in 28 (42%) patients followed by MNG in 17 (25%) patients and colloid goiter in 10 (15%) patients. This was in contrast to the findings reported by Gautam et al. with colloid goiter constituting 62% of the study population.¹² In another study by Bhartiya et al., colloid goiter constituted 86% of the final HPE diagnosis.¹³ This may be explained by the epidemiology of disease prevalence in our region and the fact that our institute is a tertiary care center with patients referred from elsewhere for thyroid malignancy. Among the thyroid malignancy, PTC constituted 90% in our study. This was slightly higher than the reported incidence of 70–80% as reported by Nguyen et al.¹⁴

Chauhan conducted a study in 2017 and found out that clinical evaluation had a sensitivity of 50% and specificity of 100% in detecting thyroid malignancy.⁴ In our study, clinical evaluation had a sensitivity of 83%, specificity of 32%, PPV of 59%, and NPV of 63% in diagnosing thyroid malignancy. Although the specificity is less, the sensitivity and NPV are considered for ruling out malignancy at clinical level in our study population.

Not many studies have been done to assess the diagnostic accuracy of clinical and intraoperative evaluation of thyroid swellings for malignancy. We believe that our study can shed light on the same. However, the relatively small sample size and

the retrospective cohort are considered as limitations of the study. The intraoperative assessment had a sensitivity of 100%, specificity of 20%, PPV of 59%, and NPV of 100% in diagnosing thyroid malignancy. On a literature search, the role of operative assessment for diagnosing thyroid malignancy could not be found. Nguyen et al. stated that USG can detect only 50% of neck nodes found during surgery, thus emphasizing the importance of intraoperative assessment.¹⁴ The sensitivity and NPV of 100% each are considered to rule out malignancy on operative assessment. The diagnosis of thyroid malignancy by intraoperative assessment was statistically significant in our study. Among the intraoperative features studied, ETE and neck nodes had a statistically significant relationship in diagnosing thyroid malignancy. The intraoperative size and surface of the swelling did not have a statistically significant relationship in diagnosing thyroid malignancy. When in doubt, the surgeon can consider intraoperative frozen section analysis which will aid in completion of surgery at the same sitting and avoid a second surgery at a later date.

CONCLUSION

Clinical evaluation forms the foundation stone for further evaluation of thyroid disorders. Even though a lot of advancements have been made in the management of thyroid disorders, clinical evaluation should not be overlooked. It should be combined with USG and cytological examinations to decide on the final treatment. Intraoperative assessment for thyroid malignancy is of paramount importance and frozen section analysis should be employed as and when necessary. With clinical examination having a sensitivity of 83% and NPV of 63% and intraoperative assessment having a sensitivity of 100% and NPV of 100%, it helps in ruling out thyroid malignancy in our study population. However, studies with a large sample size are required to further validate the statement.

CLINICAL SIGNIFICANCE

Due importance should be given to high-risk clinical and intraoperative features for early diagnosis of thyroid cancer in any population.

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