

A Study on the Clinical Presentation and the Sensitivity of FNAC in Thyroid Neoplasms

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Abstract

Background: Thyroid neoplasm includes both benign and malignant tumours arising in the thyroid gland. Although thyroid cancer accounts for only 1% of all cancers. It is the commonest endocrine tumour that shows a geographic variation in incidence of tumour, type and natural history.

Objective: To assess the clinical presentation and the sensitivity of FNAC in different types of thyroid neoplasms.

Results: This is a cross sectional study comprising 84 patients. Among them 60 cases were benign and 24 were malignant. All the 60 cases of benign thyroid neoplasm were colloid goitre. Among the 24 cases of malignancies, 14 were papillary, 6 follicular, 1 follicular variant of PTC, 1 medullary, 1 anaplastic carcinoma and 1 lymphoma. The sensitivity of FNAC in thyroid neoplasms is 92.85% with a sensitivity of 66.66% for follicular and 71.42% for papillary carcinomas.

Conclusion: FNAC is a highly useful, non-traumatic first line investigation tool for thyroid neoplasms with a good patient acceptance rate. Role of FNAC is twofold: Therapeutic and diagnostic. Thyroid swellings that were considered for FNAC included diffuse, firm, palpable, solitary nodules, nodules associated with suspicious clinical or ultrasonographic features, dominant nodules in a multinodular goitre, recurrent cystic nodules, and nodules associated with palpable lymph nodes.

Keywords: Thyroid Neoplasm, Fine Needle Aspiration (FNAC).

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Introduction

Thyroid neoplasm includes both benign and malignant tumors arising in the thyroid gland. Although thyroid cancer accounts for only 1% of all cancers (2% in females & 0.5% in males) it is the commonest endocrine tumor that shows a geographic variation in incidence of tumor, type and natural history [1]. Thyroid cancers are a heterogenous group of tumors with variable rates of growth, biological aggressiveness, histological appearance and response to therapy. These tumors are rare in children and increase in frequency with increase in age. Female to male ratio 2.5:1[2]. Over a decade, the incidence rate of thyroid cancer in India in women has increased from 2.4 (95% CI) to 3.9 and in men from 0.9(95% CI) to 1.3, a relative increase of 62% and 48% respectively[3]. The autopsy incidence of thyroid carcinoma in India has been reported to be in the range of 0.9% to 13%. It is likely that many thyroid cancers detected in these studies are not clinically significant and do not play

a role in the clinical course of the patients [4]. The annual mortality from thyroid cancer in India is only 6 per million population or approximately 1050 patients per year [5]. This discrepancy between the incidence and mortality rate presumably reflects the favorable prognosis for most of the thyroid cancers although these are capable of aggressive behavior with metastatic disease and ultimately death [6]. In thyroid, Nodules become palpable, if they increase approximately beyond 1 cm in size. Thyroid nodules may cause hypothyroidism, hyperthyroidism, cosmetic issues, and problems in other organs such as compression, and they also have the potential for malignancy [7]. Therefore, the accurate evaluation of thyroid nodules is crucial. In recent years, the role of fine-needle aspiration cytology (FNAC) is increasing regarding the management methods as well as its role in detection of malignancy potentials of thyroid

nodules [8]. No single diagnostic method used for the definitive diagnosis of thyroid cancers, such as radiographs, ultrasound, scintigraphy and suppression therapy, is effective enough to make a benign/malignant differentiation alone. FNAC has been used since the 1950s and is one of the effective methods in the diagnosis of thyroid nodules [9].

Fine-needle aspiration cytology (FNAC) of the thyroid gland is now a well-established, first-line diagnostic test for the evaluation of diffuse thyroid lesions as well as of thyroid nodules with the main purpose of confirming benign lesions and thereby, reducing unnecessary surgery [10]. BAM FORTH (1966) defined FNAC as "Examination of cells obtained by needle or drill biopsy in solid organs or tissue masses or from the cut surface of such material freshly removed by surgical biopsy" [11]. Thyroid cytology can provide a definite diagnosis of malignancy, with tumor type, enabling appropriate therapeutic surgery in one stage [12]. It can triage the remaining patients into those who potentially require surgery as opposed to medical/endocrinological management [13].

The role of thyroid cytology is twofold: Therapeutic and diagnostic. Patients got relieved from compressive symptoms after aspiration of fluid from their thyroid swellings, thus serving a therapeutic function.[14] Thyroid swellings that are considered for FNAC include diffuse, firm, palpable, solitary nodules, nodules associated with suspicious clinical or ultrasonographic features, dominant nodules in a multinodular goiter, recurrent cystic nodules, and nodules associated with palpable lymph nodes [15]. In the thyroid swelling the utility of FINE NEEDLE ASPIRATION CYTOLOGY depends upon the accuracy, with which it can predict Neoplasia in thyroid swelling there by providing [16]:

1. The potential for the avoidance of essentially diagnostic surgery in benign conditions.
2. For the planning of surgical strategy in case of carcinoma. For the avoidance of open biopsy in an advanced carcinoma.
3. The FNAC also establishes the physical characteristic of an isolated swelling in that if fluid is obtained from the cysts, if the cyst is abolished and benign then the FNAC is therapeutic.
4. A recurrent cyst or residual swelling both of which are suspicious of underlying carcinoma, indications for surgery.

However, limitations in FNAC due to scanty sample, vascularity of thyroid swelling, variation in sampling technique, and skill of the performing expert as well as the experience of pathologist interpreting the aspirate do pose a problem in definitive diagnosis [17].

Aim of the Study

- To appreciate the common symptomatology encountered in patients with thyroid neoplasms.
- To study the local examination findings suggestive of malignant Thyroid tumours.
- To find out the common histologic types of benign and malignant Thyroid tumours and calculate their frequency.
- To calculate the sensitivity of FINE NEEDLE ASPIRATION CYTOLOGY in different types of thyroid neoplasms.
- To calculate the percentage of false negative reports in FNAC.

Materials and Methods

This is a descriptive cross sectional study which was done between November 2022 to July 2024 in the Department of Surgery, VIMSAR Burla. Ethical clearance was taken from the college ethical committee prior to the study.

This study includes 84 patients who are admitted and planned for thyroid surgeries. The simple random sampling technique was used for patient selection.

Inclusion Criteria:

- All patients presenting with thyroid swellings and symptoms associated with the swelling
- Age >14 years of age
- Patients willing to undergo surgery

Exclusion Criteria: Patients presenting with non-thyroidal neck swellings.

Observation and Results: The study covered 84 cases of Thyroid Neoplasms.

Age Distribution: The mean age of all the cases with thyroid neoplasm was 43.51 years with a standard deviation of 11.654. The mean age of patients having benign tumour was 39.21 years with mode of 36 years. The mean age of patients having malignant tumors when calculated came out to be 56.62 years. The age distribution of the patients with thyroid neoplasms are as follows [table 1].

Table 1: Age Distribution

Age Group (Yrs)	Males	Females	Total	% Of Cases
21-30	1	11	12	14.21%
31-40	3	25	28	33.33%
41-50	2	19	21	25%
51-60	6	12	18	21.42%
>60	1	4	5	5.9%

Frequency of Histological Types of Tumours: Among the 84 cases, 60(71.42%) were benign and 24(28.57%) cases were malignant [table 2].

Table 2: Frequency of Histological Types of Tumours

HPE			
		Frequency	Percent
Valid	PTC	14	58.33%
	FTC	6	25%
	FPTC	1	4.1%
	MTC	1	4.1%
	ATC	1	4.1%
	L	1	4.1%
	Total	24	100.0

[FTC (Follicular thyroid cancer), PTC (Papillary thyroid cancer), FPTC (Follicular variety of PTC, MTC (Medullary thyroid cancer), ATC (Anaplastic thyroid cancer) and L (Lymphoma variant)]

Among the malignant cases, 14(58.33%) were Papillary variety of thyroid cancer, 6(25%) were Follicular thyroid cancer, 1(4.1%) was follicular variety of Papillary thyroid cancer, 1(4.1%) was Medullary thyroid cancer, 1(4.1%) Anaplastic thyroid cancer and 1(4.1%) Lymphoma variant.

Symptomatology: Thyroid enlargement was the most common presentation of the neoplasms of thyroid gland. Most of the patients presented with

painless swelling in the neck. Obstructive symptoms were rarely encountered among which hoarseness was even rarer when compared to dyspnea and dysphagia.

Lymphnode Enlargement: In 5(6%) cases with thyroid swelling in the total of 84 cases, lymph nodes were found to be enlarged whereas in 79(94%) cases, there was no lymph node enlargement [table 3].

Table 3: Lymph Node Enlargement

		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Absent	79	94.0	94.0	94.0
	Present	5	6.0	6.0	100.0
	Total	84	100.0	100.0	

Signs in Malignancy: The reliable clinical findings suspicious for malignancy are the firm/hard consistency, fixity to surrounding Structures and cervical lymphadenopathy [table 4] and [table 5].

Table 4:

Consistency					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Firm	72	85.7	85.7	85.7
	Hard	12	14.3	14.3	100.0
	Total	84	100.0	100.0	

Table 5:

Fixity					
		Frequency	Percent	Valid Percent	Cumulative Percent
Valid	Absent	76	90.5	90.5	90.5
	Present	8	9.5	9.5	100.0
	Total	84	100.0	100.0	

Sensitivity of FNAC: In this study, Total No.of true positive FNAC =78 [i.e. Both FNAC and HPE positive cases], Total No.of False negative FNAC =06 [i.e. FNAC negative and HPE positive cases], So, sensitivity of FNAC for Thyroid Neoplasms in this study is 92.85% [Table 6].

Table 6: Sensitivity of FNAC

FNAC * HPE Cross tabulation									
		HPE							Total
		CG	PTC	FTC	FPTC	MTC	ATC	L	
FNAC	CG	60	4	2	0	0	0	0	66
	PTC	0	10	0	0	0	0	0	10
	FTC	0	0	4	0	0	0	0	4
	FPTC	0	0	0	1	0	0	0	1
	MTC	0	0	0	0	1	0	0	1
	ATC	0	0	0	0	0	1	0	1
	L	0	0	0	0	0	0	1	1
Total		60	14	6	1	1	1	1	84

[CG (Colloid Goitre), HPE (Histopathological examination), FNAC (Fine needle aspiration cytology), FTC (Follicular thyroid cancer), PTC (Papillary thyroid cancer), FPTC (Follicular variety of PTC, MTC (Medullary thyroid cancer), ATC (Anaplastic thyroid cancer) and L (Lymphoma variant)]

Discussion

FNAC has evolved significantly since its inception in the early 1970s in India [21]. Initially used to diagnose specific conditions like trypanosomiasis, it has become a routine diagnostic tool for various conditions, particularly thyroid neoplasms. Its development has been marked by contributions from multiple researchers and institutions, leading to its widespread adoption and continual improvement through advancements in DNA analysis and cytological techniques [22].

FNAC is a valuable and widely used diagnostic method for thyroid cancer, providing detailed and direct information through a relatively simple and minimally invasive procedure. Proper use of instruments and patient preparation are crucial for the success and accuracy of the biopsy.

In this study of thyroid neoplasms, findings on the clinical presentation reveal that the factors like age, sex, presenting symptoms, signs, type of tumors commonly encountered, etc coincides with that of available literature, although thyroid neoplasms are well known for its wide variations in their geographical distribution.

The mean age of all the cases with thyroid neoplasm was 43.51 years with a standard deviation of 11.654. The mode was calculated to be 36. Among the total 84 cases, 71 were females (84.52%) and 13 were males (15.48%).

Out of the total 71 females, 54 had benign tumour and only 17 had malignant thyroid tumour. Among the total 13 males, 6 had benign tumors and 7 had malignant tumors.

Most of the patients presented with a painful swelling in the neck around 50(59.5%) cases with a mean of 0.60 and a standard deviation of 0.494.

Obstructive symptoms were rarely encountered among which hoarseness [7(8.3%)] was even rarer when compared to dyspnea [12(14.3%)] and dysphagia [12(14.3%)]. Among the total cases with

thyroid swelling, 72(85.7%) had firm consistency and 12(14.3%) had hard consistency. Among the total 84 cases with thyroid swelling, the swelling was found to be fixed to nearby structure in only 8(9.5%) cases. In 5(6%) cases with thyroid swelling in the total of 84 cases, lymph node was found to be enlarged. Among the total 84 histopathologically proven cases, 60 cases were benign (71.42%) and 24 cases were malignant (28.57%). All the 60 cases of benign thyroid neoplasms were colloid goitre (including few of its variants). Among the 24 cases of malignancies, 14 were papillary thyroid carcinoma, 6 was follicular thyroid carcinoma, 1 was follicular variant of papillary thyroid cancer, 1 was medullary thyroid carcinoma and 1 was anaplastic thyroid carcinoma and 1 lymphoma variant.

In this study of 84 cases of thyroid neoplasms, 78 cases were found to be true positive with a sensitivity of 92.85% and 6 cases were false negative.

The false negatives are mainly due to the following reasons:

- Aspiration not striking the representative area
- Inadequate aspiration
- Failure in producing acceptable smears
- Faulty fixation
- Geographic misses or dual pathology
- Error in interpretation

Conclusions

- This study on Thyroid neoplasms in a total of 84 cases at VIMSAR, Burla for a period of 1 year and 8 months from November 2022 –July 2024 has led to the following conclusions.
- About 71.42% of thyroid neoplasms operated were found to be benign and the remaining 28.57% malignant.
- Colloid goitre is the commonest benign thyroid neoplasm.
- Papillary carcinoma is the most common type of thyroid malignancy.

- Both benign and malignant thyroid tumors are more frequent in females. Sex ratio for benign tumours is (Male: Female) 1: 9 for malignancy it is 1: 2.4.
- Benign tumours are common in the third and fourth decade, with a mean age of 39.21 years.
- Malignant tumors are common in the fifth and sixth decade with mean age of 56.62 years.
- Painful neck swelling was the commonest presenting symptom in thyroid tumors obstructive features & signs suggestive of malignancy like hard consistency, fixity, presence of lymph adenopathy, recurrent laryngeal nerve involvement were encountered in relatively fewer cases.
- The sensitivity of FNAC in thyroid neoplasms is 92.85% with a sensitivity of 66.66% for follicular neoplasms and 71.42% for papillary carcinomas.
- The % of false negative results for Thyroid neoplasm was 7.14% with 33.33% for follicular neoplasm and 28.57% for papillary carcinoma.
- FNAC is a highly useful, simple, relatively non-traumatic first line investigation tool for thyroid neoplastic lesions with a good patient acceptance rate.

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