E-ISSN: 2616-3470
P-ISSN: 2616-3462

www.surgeryscience.com
2019; 3(3): 427-429
Received: 02-09-2019
Accepted: 26-09-2019

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Accuracy of FNAC (in correlation with histopathology) in diagnosis of thyroid swellings

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DOI: https://doi.org/10.33545/surgery.2019.v3.i3g.900

Abstract
Background & Objectives: Thyroid swellings are prevalent in the Indian population and are seen in about 4-7% of them. They are common in women and their incidence increases with age, exposure to radiation and intake o goitrogens. These swellings cause cosmetic deformity and also produce pressure symptoms due to their location and size. They are viewed with suspicion as the incidence of cancer is high. FNAC of thyroid is a sensitive, easy, cost effective, and a reliable screening test for evaluating these lesions. FNAC helps in differentiating benign from malignant lesions and is very helpful in deciding surgery and follow up of these cases.
Material & Methods: In this retrospective study FNAC results of 120 thyroid lesions were analysed and correlated with histopathology findings of the excised specimens. The objective of this study is to correlate the results of FNAC and histopathology of thyroid lesions, and assess the role of FNAC in diagnosing thyroid swellings. FNAC is a safe, accurate method with high sensitivity specificity.
Results: The reports of FNAC and histopathology were similar in 50 patients while dissimilar in 2 patients. These cases were compared and efficacy of FNAC was checked by calculating the sensitivity, specificity, positive predictive value and negative predictive value. Out of 50 patients, FNAC showed 46 cases as benign and 4 cases as malignant. The sensitivity was 66.66% and specificity 97.65%.
Conclusion: Among benign tumours most common was benign multinodular goiter and among malignant lesions, papillary carcinoma.

Keywords: FNAC, histopathology, thyroid swelling

Introduction
Thyroid swellings are frequent cause for anxiety in patients as well as clinicians and proper accurate diagnosis is essential for their management. They cause cosmetic deformity, pressure symptoms related to trachea, esophagus and blood vessels. Fine needle aspiration is a popular, safe, accurate diagnostic method accepted worldwide for diagnosing thyroid swellings [1].
Diseases of thyroid gland is a common clinical presentation with a prevalence rate of 4-7% in the general population. The incidence being higher in endemic areas. Age has got a great influence in occurance of goitre and incidence is higher among females [2, 3]. A multitude of noninvasive and invasive diagnostic tests like ultrasound, thyroid nuclear scan and FNAC is available to the clinician for the evaluation of thyroid swellings. FNAC is a simple, cost effective, readily repeated, quick to perform procedure in the outpatient department with excellent patient compliance. It is often used as the initial screening test for the diagnosis of thyroid diseases. The use of FNAC in the diagnosis of thyroid lesions was first reported by Martin and Ellis in 1930 [4]. If euthyroid, then FNAC provides direct specific information about the cytology of the nodule from which histology can be inferred. Important factor for satisfactory test includes representative specimens from the nodule and an experienced cytologist to interpret findings. FNAC is however without limitations; accuracy is lower when there is overlapping cytologic features mainly in samples obtained from hyperplastic nodule and follicular neoplasm, also due to inadequate sampling. After surgery histopathology report may be different from FNAC. It's limitations include false negative results and rarely false positive results. In a study of Thyroid swellings by Bloch, comparing FNAC and Histopathology results, the accuracy of FNAC was found to be 91.6% Bloch [4] (1997). In a similar study by Mundasad *et al.*, [6] (2006) the sensitivity of FNAC was found to be (52.6%) and specificity (82.2%) and accuracy (79.1%) for thyroid malignancies. In a study by Handa *et al.*, [5] (2008) on thyroid swellings, the sensitivity and specificity of FNAC was 97% and 100% respectively.

Aims & Objectives

1. To study accuracy of cytopathological diagnosis of thyroid swellings by FNAC.
2. To compare and analyze FNAC of thyroid swellings with that of histopathological study and clinical diagnosis.
3. To study the role of FNAC in determination of malignant from benign thyroid swellings.
4. To find limitations of FNAC.

Materials & Methods

50 patients who presented with thyroid swelling to Department of Surgery & ENT were clinically evaluated. All the selected 50 patient underwent Fine Needle Aspiration Cytology of the thyroid and were treated surgically by Thyroidectomy. Results obtained from FNAC were compared with the histopathological diagnosis of the specimen obtained after surgery to study the diagnostic accuracy of aspiration cytology.

Results

Age Incidence: Age group of 21-40 yrs had maximum number of patients and accounted for 68% of the patients. Least number of patients were in the age group of 61-80 i.e. 2%. The mean age of our study was 34.2yrs. The age distribution of patients are depicted below.

Table 1: Age Incidence

Age Group (YRS)	Number	Percentage
0-20	2	4 %
21-40	34	68%
41-60	14	28%
61-80	1	2%
81-100	0	0%

Gender wise distribution

Females made up the majority of the patients. Females accounted for (45)90% &males accounted for (5)10% of patients.

Among the females 93.3% had benign swelling & 6.7% had malignant tumours of thyroid. Among the males 80% had benign swelling & 20% had malignant tumours of thyroid gland.

Table 2: Sex

	Benign	Malignant	Total
Males	4	1	5
Females	42	3	45

Table 3: FNAC Diagnosis

Colloid goitre	18	36%
Multinodular goitre	24	48%
Toxic nodular goitre	2	4%
Grave's disease	1	2%
Thyroiditis	2	4%
Follicular neoplasm	3	6%
Papillary carcinoma	2	4%
Total cases	50	100%
Total Benign	46	92%
Total malignant	4	8%

Table III gives the breakup of number of cases in each pathological variant of thyroid disease as per FNAC diagnosis.

The histopathological diagnosis of all the above cases was made post-surgery and was considered the final diagnosis. The breakup of number of cases in each category as per histopathology of the specimen.

Table 4: Histopathology

Colloid goitre	16
Multinodular goitre	22
Toxic nodular goitre	2
Grave's disease	1
Thyroiditis	1
Follicular carcinoma	3
Papillary carcinoma	1
Total cases	50

Comparison of the histopathological diagnosis with fine needle aspiration reports is cited below:

Table 5: FNAC

	Colloid	MNG	Toxic MNG	Grave's	Carcinoma		Thyroiditis
					Papillary	Follicular	
FNAC	17	23	2	1	1	3	1
HPE	18	22	2	1	1	3	0

Of the 23 cases diagnosed to be multinodular goitre 1 case came as colloid goitres. Of the 17 cases diagnosed as colloid goitre, 4 cases were later found to be multinodular goitre and 1 case was follicular carcinoma.1 case diagnosed to be follicular carcinoma was found to be multinodular goitre. 1 case of hashimoto's thyroiditis came to be multinodular goitre.

Corresponding breakup in FNAC diagnosis Reports from FNAC & histopathology were grouped under benign & malignant conditions & the true positives, true negatives, false negatives & false positives were calculated.

Table 6: FNAC & Histopathology

FNAC		Histopathology	
		Benign	Malignant
Benign	46	44(True negatives)	2(False negatives)
Malignant	4	1(False positives)	3(True positives)

Discussion

Thyroid enlargement whether diffuse or in the form of a nodule leads to a battery of investigations, mainly to rule out the possibility of a neoplasm. Fine Needle Aspiration Cytology is regarded as the gold standard initial investigation in the diagnosis of thyroid swellings. This is a safe, simple and quick technique with a low complication rates and helps to select people preoperatively for surgery.

Thyroid gland carcinoma accounts for less than 1% of all cancers and is responsible for 0.5% of all cancer-related deaths10. Early diagnosis of such cases is thus important for aiming at higher life expectancy especially since thyroid gland cancers have a low malignant potential and also have a slow progressive property. Majority of the clinically diagnosed palpable thyroid nodules are non-neoplastic. Multiple aspirations avoid missing a neoplastic focus. Every thyroid FNAC should be evaluated for adequacy of the smears. FNAC used together with other diagnostic modalities such as thyroid scanning, ultrasonography, thyroid hormone and antibody level measurements enhances the diagnostic accuracy of the technique. All the patients, tolerated the aspiration procedure and there were no complications.

In the present study, the age of patients ranged from 19 years to 60 years. This age range and mean is similar in many studies. We found out that majority of patients were in the third decade of life. This is in accordance with the study of Tariq *et al.* and Zangana *et al.* [8, 9].

Our study showed thyroid diseases were more common in females. The present study showed FNAC is highly useful in the initial evaluation of thyroid swellings with sensitivity 66.67% and specificity 97.65%. Different studies have reported the FNAC of thyroid nodule to have a sensitivity 4-9 range from 65%-98% and a specificity of 72-100%. A single false negative case was diagnosed cytologically as colloid goiter with cystic change. It is because the needle may not have punctured the actual 1cm nodule seen on histological examination and that only the surrounding thyroid showing colloidal changes was aspirated.

Pitfalls in FNAC as mentioned by Shaha *et al*., (2000) [10] are regarding the adequacy of the specimen, accurate sampling technique, and overlapping cytological features between benign and malignant follicular and hurthle cell lesions and, differentiating lymphocytic thyroiditis from lymphoma.

In conclusion the results of our study are comparable to current published data. FNAC is an accurate, simple and safe diagnostic modality for investigating thyroid swellings and has high accuracy and specificity. It is of immense value in diagnosis of benign lesions like colloid goiter, hashimoto's thyroiditis, and malignancies. It is a useful preoperative tool especially in developing countries like India. (Rout *et al*., 2011) [11] Surgical resection and histopathological examination is required for indeterminate or suspicious lesions.

Conclusion

FNAC is a simple, safe and cost effective diagnostic modality in the investigation of thyroid disease with high specificity and accuracy. But it can give false negative results. Thus even if FNAC can provide a diagnosis the ultimate answer rests in the histopathologic examination of excised thyroid tissue.

Acknowledgment

The author is thankful to Department of General Surgery for providing all the facilities to carry out this work.

Conflict of Interest: None.

Funding Support: Nil.

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