

A Comparative Study of Fine Needle Aspiration Cytology with Histopathology of Thyroid Swelling

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ABSTRACT

The thyroid gland arises as an out pouching of the primitive foregut around the third week of gestation. It originates at the base of the tongue at the foramen caecum. Endodermal cells in the floor of the pharyngeal anlage thicken to form the medial thyroid anlage. It descends from foramen caecum in front of pharynx as a bilobed diverticulum. By the end of 2nd month thyroid reaches its final position in front of trachea. The lower end of the diverticulum enlarges to form gland and the rest i.e., thyroglossal duct disappears. The purpose of this study was to observe the correlation of FNAC and histopathology in various thyroid swellings, Solitary nodular goiter, Multi nodular goiter, Suspected malignancy of thyroid, Malignancy of thyroid, to stress the importance of HPE as final diagnostic tool.

Key words: Gestation, Thyroid gland, Diverticulum, Malignancy

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INTRODUCTION

Thyroid gland is unique among endocrine organs. It is the largest endocrine gland in the body and the first to develop in fetal life. A thyroid nodule is either palpable clinically or ultrasound detected. Prevalence ranges from 4% to 10% in general adult and 0.2 to 1.5% in children. Nodular goitres are more common in women because of the presence of oestrogen receptors in thyroid tissue. Most of the nodules are benign and only 5 to 10% of these nodules are malignant.

A multitude of diagnostic tests like ultrasound, thyroid nuclear scan, fine needle aspiration cytology (FNAC) and many more are available to evaluate a thyroid swelling. Final diagnosis requires morphological examination of lesions for which FNAC, and histopathological examination (HPE) becomes mandatory tests.

Fine needle aspiration cytology (FNAC) is now being accepted as the most cost-effective, minimal invasive technique with exceptionally low incidence of complications in the diagnosis of most of the thyroid lesions with an added advantage of segregating the patients of solitary thyroid nodule (STN) into operative and non-operative groups.

Still the histopathological examination of the thyroid gland was considered superior to FNAC in diagnosing the thyroid pathologies due to certain pitfalls in FNAC such as

scanty sample, vascularity of thyroid swelling, variation in sampling technique and skill of the performing expert and as well as the experience of pathologist interpreting the aspirate. This study involves comparison of the diagnostic efficacy between FNAC and histopathology in our study population [1-19].

MATERIALS AND METHODS

These studies include the patients who were operated for solitary and multinodular thyroid disease, suspicious malignant disease, and malignant disease. All cases were studied in detail with detailed clinical examination and investigations. Cases with hard thyroid swelling, male sex, fixity to surrounding structures, nerve involvement and cold nodules are studied in detail to rule out malignancy. Cases with cystic swellings are not aspirated they were subjected to surgery to rule out papillary carcinoma.

Procedure

Initial examination should be with patient in upright position, but FNAC done in supine position. Place a pillow under the neck. Ask the patient to keep still and to refrain from swallowing. Perform 2 to 4 aspiration in same session. Depending on the size of the thyroid swelling use different angles and change in point of entry. Cells are placed and prelabelled in dry glass slides. Some are immediately placed in 70% alcohol while others are air dried. The stain used is papanicolaou or Wright's stain. Skilled pathologist can accurately diagnose thyroid lesions.

Group I-Benign

All patients whose clinical examination showed features of solitary or multinodular thyroid disease with preoperative FNAC as nodule, colloid, adenomatous goitre.

Group II - Suspicious malignancy

Solitary nodular or multinodular goitre with pre-operative FNAC showing suspicious of malignancy/ suspicious of follicular neoplasm.

Group III -Malignancy

Hard swelling, Pre-operative FNAC showing malignancy, H/o recent voice change, H/o difficulty in breathing or swallowing, Fixity to surrounding structures. Lymph node enlargement (secondary from thyroid nodule).

All 60 patients underwent surgery.

Final histopathology report obtained for all patients.

RESULTS

In our study out of 60 patients 7 were male and 53 were female patients. Solitary thyroid Nodule observed in 15 cases (Male 1-Female 14) Multinodular goitre observed in 45 cases (Male -6, Female- 39) (Table 1 and Figure 1).

Nodular thyroid disease occurred in age group of 20 to 70yrs. Youngest patient 27 yrs. oldest patient 67 yrs.

(Table 2 and Figure 2). Further results are illustrated in Tables (Table 3 to Table 9) and Figures (Figure 3 to Figure 8).

Table 1: Sex incidence.

Sex	Solitary nodular goiter	Multinodular goitre
Female	14	39
Male	1	6

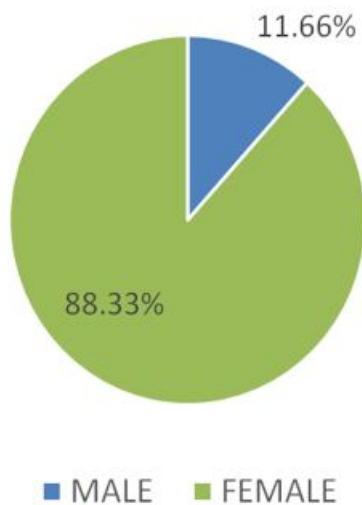


Figure 1: Sex incidence.

Table 2: Age incidence.

Age Limit	Solitary nodular Goitre	Multinodular Goitre
21-30	0	2
31-40	6	9
41-50	4	11
51-60	4	20
61-70	1	3

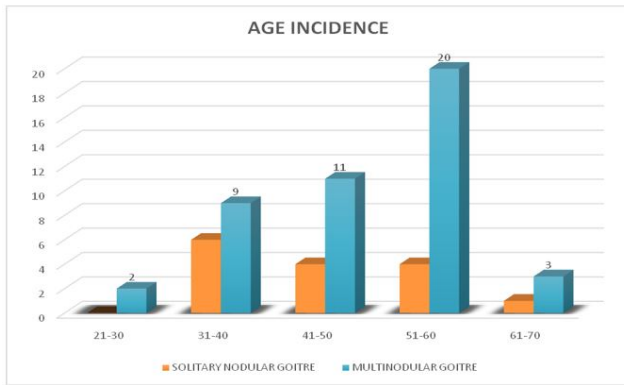


Figure 2: Age incidence.

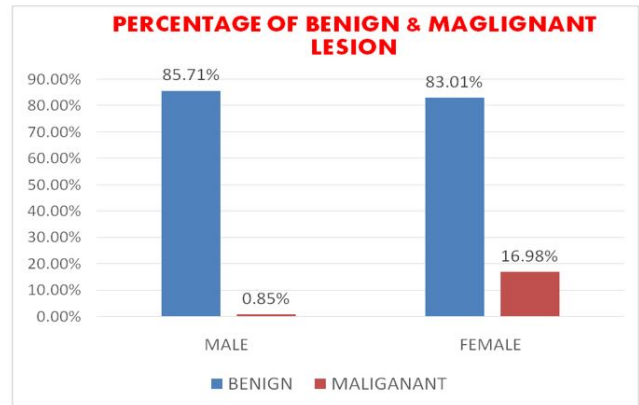


Figure 3: Percentage of benign & malignant lesion.

Table 3: Incidence as per FNAC.

Diagnosis-cytological	No. Of cases
Nodular colloid goitre	50
Papillary carcinoma	3
Suspicious of follicular Carcinoma	6
Medullary carcinoma	1

Table 4: Incidence & percentage in SNG & MNG as per FNAC.

Diagnosis	Solitary Nodular Goitre	Multinodular Goitre	Percentage
Nodular Colloid goitre	14	36	83.33%
Papillary Carcinoma	1	2	5%
Suspicious of Follicular carcinoma	-	6	10%
Medullary Carcinoma	-	1	1.66%

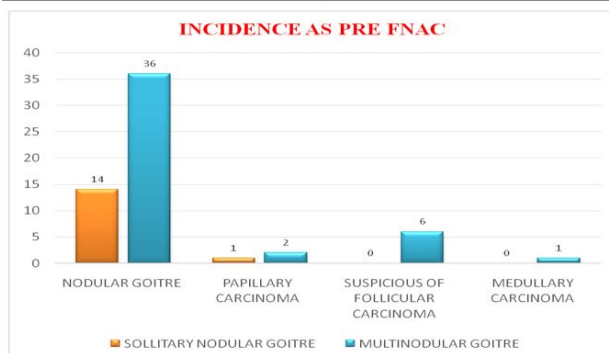


Figure 4: Incidence as per FNAC.

Table 5: Incidence as per histopathology report.

Diagnosis-Histopathological	No. Of Cases	Percentage
Nodular colloid Goitre	42	70%

Papillary carcinoma	7	11.60%
Follicular carcinoma	2	3.30%
Medullary carcinoma	1	1.60%
Follicular adenoma	7	11.60%
Hashimotos Thyroiditis	1	1.60%

Table 6: Incidence in male & female as per histopathology.

Diagnosis	Female	Male
Nodular colloid Goitre	36	6
Papillary carcinoma	6	1
Follicular carcinoma	2	-
Medullary carcinoma	1	-
Follicular adenoma	7	-
Hashimotos thyroiditis	1	-

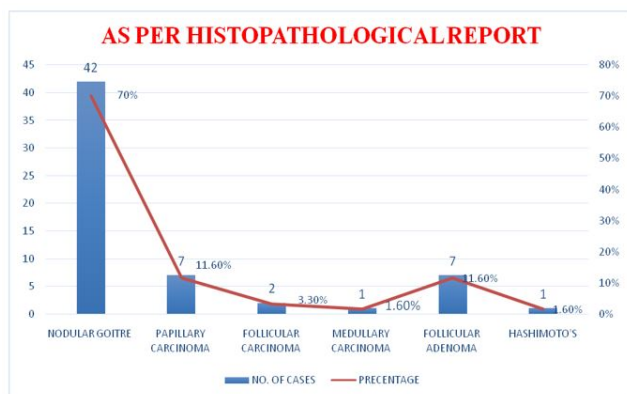


Figure 5: Incidence as per histopathology report.

Table 7: Diagnosis of thyroid swelling in FNAC & histopathology.

Diagnosis	FNAC	Histopathology
Nodular colloid Goitre	50	42
Papillary carcinoma	3	7
Suspicious of Malignancy	6	-
Follicular Carcinoma	-	2
Medullary Carcinoma	1	1
Follicular adenoma	-	7
Hashimotos Thyroiditis	-	1

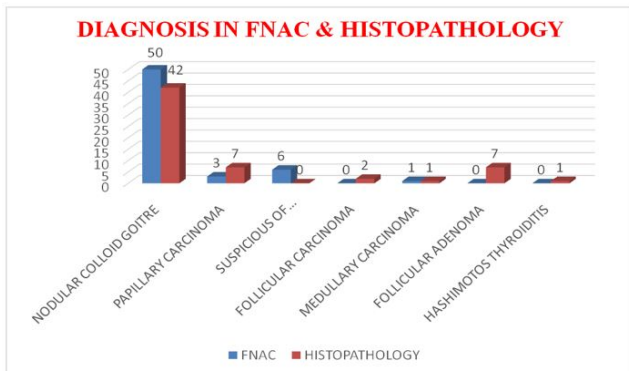


Figure 6: Diagnosis in FNAC & histopathology.

Table 8: Incidence of Malignancy In SNG & MNG.

Type of malignancy	Solitary nodular Goitre	Multinodular goitre
Papillary Carcinoma	1	6
Follicular Carcinoma	0	2
Medullary Carcinoma	0	1

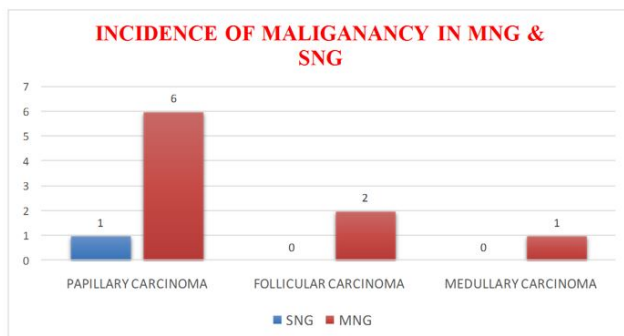


Figure 7: Incidence of malignancy in MNG & SNG.

Table 9: Percentage of malignancy in SNG & MNG.

	Solitary nodular Goitre	Multinodular goitre
Percentage of Malignancy	6.66%	20%

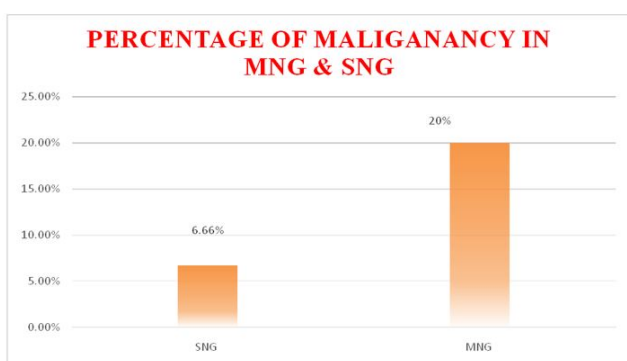


Figure 8: Percentage of malignancy in SNG & MNG.

Group I – Benign

- Number of benign disorders diagnosed by pre-operative FNAC=50.
- Correlated with HPE=42.
- Percentage of correlation=84%.
- Discordance in biopsy =8.
- Percentage of discordance=16%.

Group II-Suspicious of malignancy

- Number of Pre-operative FNAC diagnosed as suspicious of malignancy=6.
- Correlated with Biopsy=3.
- Percentage of correlation=50%.
- Discordance in Biopsy=3.
- Percentage of discordance=50%.

Group III-Malignant

- Number of Pre-operative FNAC diagnosed as malignant=4.
- Correlated with Biopsy=4 cases.
- Percentage of correlation=100%.
- Percentage of discordance=0% (Figure 9 and Figure 10).

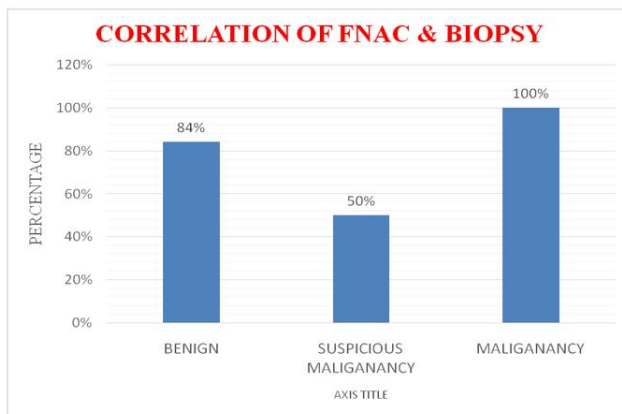


Figure 9: Correlation of FNAC & biopsy.

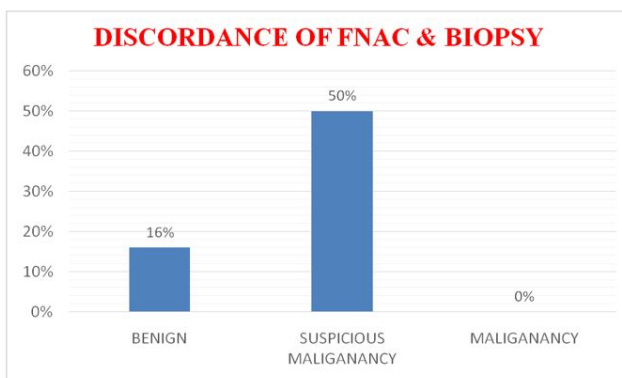


Figure 10: Discordance of FNAC & biopsy.

DISCUSSION

FNAC is easy to perform and safe with minimum complication rate. Care must be taken to obtain an adequate specimen-most authors recommend between 3 to 6 aspirations is needed. Satisfactory specimen contains at least 6 groups of 10 to 15 well preserved cells. They are categorized by their appearance to benign, indeterminate, or suspicious and malignant.

The diagnosis of papillary thyroid carcinoma by FNAC based on characteristic nuclear changes is reliable and accurate with sensitivity and specificity both approaching 100%.

In our study among 60 cases, 3 cases are reported as papillary carcinoma in FNAC. But after HPE report 7 cases are diagnosed as papillary carcinoma. So the discrepancy of 4 cases, the FNAC diagnosis of 4 cases were one as suspected follicular carcinoma and 3 cases were nodular colloid goitre type. In case of follicular neoplasm, the sensitivity of FNAC is about 90% and specificity less than 50% this limits the usefulness of FNAC. Tpo immuno chemistry with monoclonal antibody (MO Ab 47) improves the accuracy of FNAC for follicular lesions. It increases sensitivity to 100% specificity to 70%. Mundasat et al. [15] conducted a study on Accuracy of FNAC in diagnosis of thyroid swellings. In their study among 144 patients - FNAC revealed 94% benign, 6% malignant 4% suspicions. 13% inadequate, 4% indeterminate. But histopathology showed 82% benign,

18% malignancy. In their study the inadequate sample rate was 13%. The most important factors include experience of the aspirator and criteria used to define a satisfactory sample. Published dates suggest inadequate sample ranges between 9 to 31% in their study false negative rate is 23% i.e., FNAC negative for cancer but histology positive for cancer.

As per AACE /AME task force on thyroid nodules Endocr pract 2006:124 63 -102 the average false negative rate is 5% their guidelines to minimize false negative results are [9].

Oliver H beechars et al stated that goitres were frequently seen in women however, the incidence of carcinoma in man is greater than in women. In our study among 60 cases, the incidence of carcinoma in Male (1.6%) is greater than in female (15%). This is in accordance with various published reports. Fenn A.S et al 1976 found that there was no great sex predominance in the incidence of malignancy [20].

According to Dr. C. Surya Prakash Rao et al. adenoma thyroid was the commonest benign lesion and papillary carcinoma was the commonest malignant lesion. Prof. R.L Gupta Delhi analyses 370 cases of solitary nodule. In his study, about 38.7% of HPE report was different from FNAC. His study showed the fact that FNAC is not full proof and surgery with HPE report remain the only method of confirmation [21].

As Per Hossein gharib and papini et al. [8] nodule size is not predictive of malignancy. They have reported the following features are associated with increased risk of malignancy in thyroid nodule.

They concluded that risk of cancer is not significantly higher for solitary nodular than for glands with multiple nodules. But in our study the incidence of carcinoma in solitary nodular goitre (6.66 %) is more than multinodular goitre (20%).

According to koh and cole WH et al, the incidence of carcinoma in MNG Varies from 7% to 17% [14]. In our study the incidence of carcinoma in MNG is 20%.

Pier paolo gandolfi, et al [13] Italy conducted retrospective study among 58 cases who were operated for MNG. In their study, the incidence of carcinoma is 13.7%. They have stated that risk of malignancy should not be underestimated and a dominate nodule in MNG should be valued as it were a single nodule in an otherwise normal gland.

Raghuveer pedamullu, et al. conducted a retrospective study of 98 cases of MNG who underwent total thyroidectomy at Guntur government general hospital (India) from 2001 to 2004 he found the prevalence of MNG in female 88% in males 12% and incidence of female 88%. He concluded that despite negative FNAC the patients can still harbor a malignant focus due to high sampling error with MNG [12]. In our study FNAC showed 50 cases of nodular colloid goitre but histopathology showed on ly 42 nodular colloid goitre cases, the 8 cases turned out to be, papillary carcinoma in

3 cases, follicular adenoma in 4 cases, hashimoto's thyroiditis in one case.

E Ghosal B Paul et al, analysed 75 patients with solitary nodule accurate correlation of FNAC HPE and report was possible only in 55 cases [22]. In our study among 15 solitary nodular goitres FNAC and HPE report correlation was possible only in 13 cases.

In a study done by Safirullah et al. it was reported the accuracy of FNAC as 94.2%, and another study done by Mundasad et al. and Gupta et al. the accuracy was 80% and 85% respectively [23-31]. In our study the accuracy of FNAC in detection of the thyroid swelling was found to be 80%.

CONCLUSION

In our study the commonest thyroid disease affecting study population are solitary nodular goitre, multinodular goitre, hashimoto's, papillary carcinoma thyroid. Incidence of carcinoma in solitary nodular goitre 6.66%.

FNAC is simple, safe, and cost effective but HPE remains final diagnostic tool. Because FNAC cannot differentiate between adenoma and carcinoma in follicular and hurtle cell lesions. The suspicious results in FNAC prove to be an area of uncertainty often resolved by diagnostic surgical resection. In case of Multinodular goitre even if the preoperative FNAC is negative it does not exclude with certainty the possibility of a carcinoma because the error in sampling the right area is greater. Such evaluation may lead to non-radical operation and the need of a second surgery or radio therapy.

FUNDING

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ETHICAL APPROVAL

The study was approved by the Institutional Ethics Committee.

CONFLICT OF INTEREST

The authors declare no conflict of interest.

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