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Cytological evaluation of false negative rate in thyroid: an institutional experience

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Abstract
Background: *FNAC is a simple, safe, cost effective diagnostic procedure that provides rapid diagnosis in evaluation of thyroid lesions.*
Aim: *The aim of this study was to analyse false negatives and false positives in palpable thyroid nodules*
Materials and methods: *A two-year prospective study was done in department of pathology Gitam institute of medical sciences and research. During the study period 99 aspirations were done, on aspiration lesions were grouped into three categories. Histopathological correlation was possible only in 35 cases.*
Results: *Cytohistopathological correlation for nodular goitre was 48.5%. false negative rate was 31.4%, false positive rate was 5.7%.*
Conclusion: *It is difficult to differentiate between nodular goitre and follicular neoplasm on FNAC due to cytomorphologic similarities. FNAC results must be interpreted in combination with radiological and histopathological findings.*
Keywords:*Fine needle aspiration cytology, false negative, false positive*

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I. Introduction

Thyroid nodules are common and usually benign, but may be malignant. Thyroid FNA is accepted for evaluation of thyroid nodule as it is safe, cost-effective, reliable and non-invasive technique.

Iodine deficiency is another risk factor that correlates with higher incidence of benign thyroid nodules including adenomas. Palpable thyroid nodules are two to three times more common in areas of low iodine consumption as compared with iodine sufficient areas. A significant proportion of these nodules are adenomas[1].

The present study was undertaken to analyse false positives and false negatives in thyroid FNA in correlation with histopathogical diagnosis.

II. Materials and Methods

A two-year prospective study was done in the department of pathology from 2016 to 2018. During this period 99 aspirations were done on patients who came to OPD with chief complaint of thyroid swelling.Prior to aspiration clinical examination was done and verbal consent was obtained after brief explanation about the procedure to the patient in local language.

Aspiration was done with patient lying comfortably in a supine position with head & neck extended over a pillow to make thyroid swelling appear prominent. Under aseptic conditions, 23-gauge needle was inserted into lesion without syringe, to and fro movement was performed quickly. Material gets collected in the bore by capillary suction. The needle hub was attached to air filled syringe and plunger was pushed down to expel the material onto a clean labelled glass slide. Several smears were made in each case and fixed in 95% ethyl alcohol, stained by hematoxylin and eosin. Of 99 patients who underwent FNA only 35 turned up for histopathology, which formed the material for cytohistocorrelation. Formalin fixed paraffin embedded tissues of 35 thyroidectomy specimens were routinely processed and histological sections were stained with hematoxylin and eosin.

III. Results

During the study period aspirations were done on 99 patients with palpable thyroid swelling of which females were 88 (89%) and males were 11(11%) with a male to female ratio of 8:1. Age of patients ranged from 13 to 78 years. On FNAC lesions were grouped into 3 categories, non-neoplatic, neoplastic and inadequate.

Table-1DISTRIBUTION OF THYROID LESIONS ON FNAC N=99

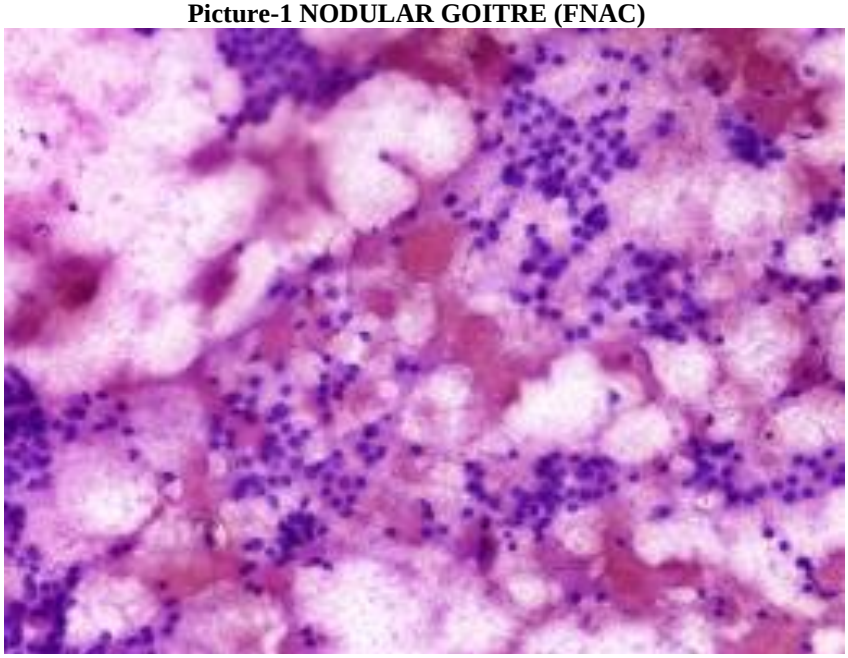
Non-neoplastic	87 (88%)
Neoplastic	9 (9.1%)
Inadequate	3 (3%)

The maximum number of patients were in the age group of 36-45 years. In our study on FNAC nodular goitre with or without cystic change was the most common non-neoplastic lesion comprising of 67 cases (67.6%) and in neoplastic lesions follicular neoplasm was most common.

Table-2 Non-neoplastic & neoplastic lesions on FNAC N=99

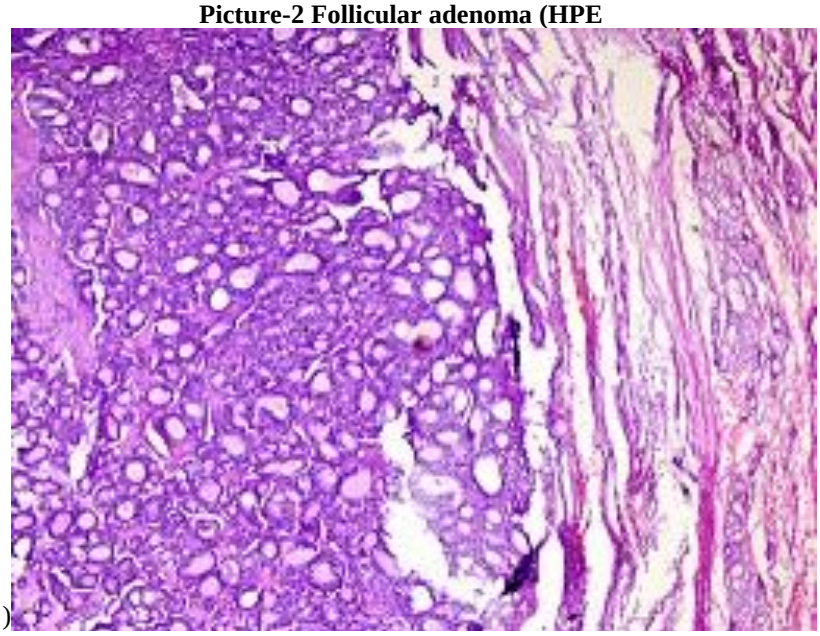
Non-Neoplastic	N=87
Nodular goitre with or without cystic change	67 (67.6%)
Colloid goitre	10 (10.1%)
Colloid cyst	3 (3.0%)
Hashimoto's thyroiditis	4 (4.0%)
Lymphocytic thyroiditis	(3.0%)
Neoplastic	N=9
Follicular neoplasm	6 (6.1%)
Hurthle cell neoplasm	1 (1.0%)
Papillary carcinoma	2 (2.0%)

Picture-1 NODULAR GOITRE (FNAC)



35 biopsies were received which formed the material for cytohistocorrelation, reaming cases were lost to follow-up. Cytohistological concordance for nodular goitre was seen in 17 cases (48.5%) and were discordant in 11 cases (31.4%). Discordant 11 cases of nodular goitre on FNAC were diagnosed as Follicular adenoma on histopathology. False negatives were 31.4% and false positives were 5.7% in this study.

Picture-2 Follicular adenoma (HPE



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Picture-3 Hurthle cell adenoma

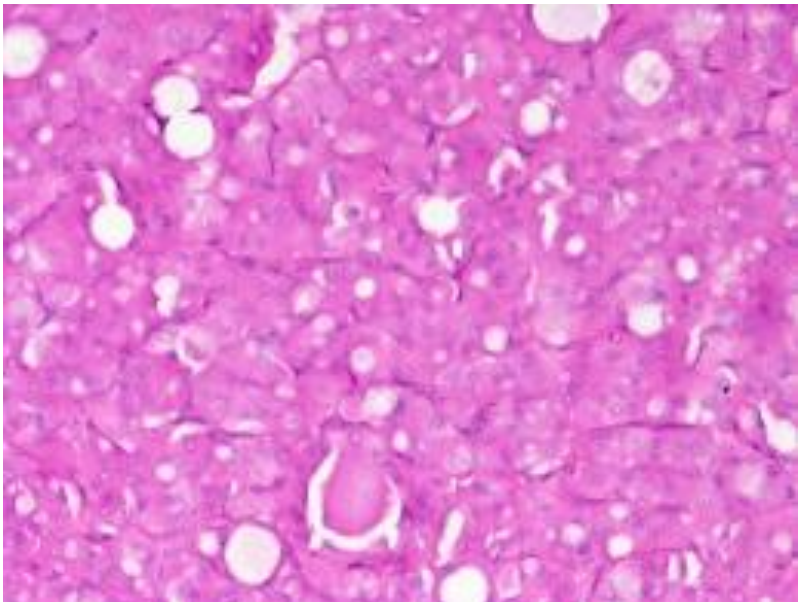

Table-3 Comparison of FNAC with Histopathological diagnosis

FNAC diagnosis	**|Histopathology diagnosis**	**remarks**	**Total N=35**
Nodular goitre	Nodular goitre	True negative	13
Nodular goitre	Hashimoto's thyroiditis	True negative	4
Nodular goitre	Follicular Adenoma	False negative	11
Follicular neoplasm	Follicular Adenoma Papillary carcinoma	True positives True positive	2 1
Hurthle cell neoplasm	Hurthle cell adenoma	True positive	1
Follicular neoplasm	Adenomatous hyperplasia	False positive	1
Follicular neoplasm	Nodular goitre	False positive	1
Inadequate	Follicular adenoma		1

*Non-neoplastic lesions were taken as true negative

In this study sensitivity was 26.7%, specificity was 89.5% and diagnostic accuracy was 61.8%

IV. Discussion

In our study age of patients ranged from 13 to 78 years, age range was comparable with Pandey P.et.al[2] and Kavitha K et.al[3]. Thyroid lesions prevalence was more in females with a female to male ratio of 8:1 similar female preponderance was seen in other studies[3,4,5,6].

In this study 88 % were Non-neoplastic and 9 % were neoplastic on FNAC like study by Savjiani N et.al in which non-neoplastic were 86% and neoplastic were 14%[7].

In our study 3% of aspirates were inadequate, in the study by Agarwal R et.al inadequate aspirates were 2.49% so rate of inadequate aspirates were similar to Agarwal R et.al[8]. Majority of thyroid lesions were seen in 36-45 years age group which corresponds to studies by other authors[5,9,10,11,12,13,14].

On aspiration cytology nodular goitre with or without cystic change was most common non-neoplastic lesion, which constituted 67 Cases (67.6%), in a study by Chaudari S et.al[10] nodular goitre accounted for 62 cases,Kumar M et.al also observed that nodular goitre was most common non-neoplastic lesion.[15]

In this study, follicular neoplasms were 6.1% and hurtle cell neoplasm were 1.0% of total neoplastic lesions on FNAC. Kumbhakar D[14] also saw 6.32% follicular neoplasm and 1.5% hurtle cell neoplasm was observed by Ramteke DJ et.al. our findings are consistent with Kumbhakar D and Ramteke DJ et.al[11].

35 biopsies were received for cytohistoco-rrelation, on cytohistoco-relation false positives were 5.7% in our study similar to HaberalA.N et.al[16] (5.7%). Cytohistological discordance was reported in 11 cases of nodular goitre with false negative rate of 31.4% and on subsequent histopathological examination diagnosed as Follicular adenoma. Narayani VL et.al[17] noted false negative rate of 19.8%.The false negative rate of cytology in follicular neoplasm may be 30% or more because of inability to recognize normofollicular neoplasms[18]. However, these distinctions are of little clinical importance if nodule is recognised as benign and spared from unnecessary surgery.

Table-4- Sensitivityand specificity of test comparison

Study	Sensitivity	Specificity	Diagnostic accuracy
Present study	26.7%	89.5%	61.8%
Gupta et.al[19]	80.0%	86.6%	84.0%
Bukhari MH et.al[20]	90.0%	87.5%	87.0%
Borghain R et.al	82.14%	86.8%	83.6%

Most of diagnostic procedure have their own limitations and diagnostic fallacies, which includes false positives and false negatives. Follicular neoplasm forms a differential diagnosis comprising follicular adenoma, adenomatous nodule and follicular carcinoma because of their cytomorphologic similarities, distinguishing between hyperplastic (adenomatous nodule) and follicular neoplasm sometimes is tough and has been subject of many studies. Cytologically it is almost impossible to differentiate hyperplastic nodule from so called macrofollicular adenoma or simple adenoma[21]. Our findings are consistent with those reported in literature.

V. Conclusion

The scope and limitations of FNAC should be fully realized, especially in interpretation of adenomatous goitre and follicular neoplasm.

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