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The role of cytology in diagnosing follicular pattern lesions of thyroid in a tertiary care hospital

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Abstract

Introduction: Fine needle aspiration cytology (FNAC) plays a vital role in diagnosing thyroid lesions. However, follicular patterned lesions need to be evaluated meticulously due to markedly overlapping cytomorphological features.

Aim: The study aimed to evaluate the role of FNAC in follicular-patterned lesions of thyroid.

Materials and Methods: A retrospective study of 50 cases in which thyroid FNAC showed follicular-patterned lesions along with histopathological correlation wherever available was done over a period of 3 years (November 2024-October 2021).

Results: Out of 50 cases of follicular-patterned lesions, 44 cases were reported as adenomatous goiter (AG), 5 cases of follicular neoplasm (FN), and 1 case of follicular variant of papillary thyroid carcinoma (FVPTC) on FNAC. Out of total 30 cases available for histopathological correlation, 7 cases (23.3%) showed discordance and the possible causes for the discordance were analyzed.

Conclusion: Diagnosing follicular-patterned lesions on FNAC is challenging and will remain a “gray zone” for all cytopathologists. A thorough examination of all cytological smears should be done for predominant follicular pattern along with cytomorphological and background details to differentiate follicular-patterned thyroid lesions in order to minimize false negative diagnosis on FNAC.

Keywords: Fine-needle aspiration cytology, follicular-patterned lesions, thyroid

Introduction

Over the past 3 decades, fine needle aspiration (FNA) has developed as the most accurate and cost-effective initial method for guiding the clinical management of patients with thyroid nodules. Thyroid FNA specimens containing follicular-patterned lesions are the most commonly encountered and include various forms of benign thyroid nodules, follicular carcinomas, and the follicular variant of papillary thyroid carcinoma. Based primarily upon the cytoarchitectural pattern, FNA is used as a screening test for follicular-patterned lesions to identify the majority of patients with benign nodules who can be managed without surgical intervention. In experienced hands, the diagnostic accuracy of thyroid FNA for technically satisfactory specimens ranges from 80 to > 95% [1]. The major cause of false positive and false negative rates at FNAC has been attributed to follicular patterned lesions. There are several studies published in literature revealing the difficulties posed by the pathologist in the area of follicular patterned lesions of thyroid [2, 3]. In the present study the efficacy of FNAC in the diagnosis of the follicular patterned lesions of thyroid was evaluated.

Materials and Methods

A retrospective study of 50 cases of FNAC of follicular-patterned thyroid lesions was conducted over a period of 3 years (November 2024-October 2021). All the FNA cases were collected from cytopathology files irrespective of age and sex. The inclusion criteria of the present study was cytological smears showing predominant follicular pattern on thyroid FNAC. Exclusion criteria was inadequate smears. The cytological diagnosis was correlated with histopathological diagnosis wherever available. The lesions were classified into three categories as adenomatous goiter, follicular neoplasm and follicular variant of papillary carcinoma (FVPTC).

Results

Results are summarized in Tables 1 to 5 and two representative smears are shown in Figures 1 & 2. There were a total of 30 cases where cytohistological correlation was available. Of these, 20 cases had AG, 2 FN, and 1 FVPTC.

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Table 1: Incidence of follicular patterned thyroid lesions

Type of lesion	No of cases	Percentage
Adenomatous goiter	44	88%
Follicular neoplasm	05	10%
Follicular variant of papillary thyroid carcinoma	01	02%
Total cases	50	100%

Table 2: Cytological-histological correlation

Cytological diagnosis	No of cases	Histological concordance	Histological discordance
Adenomatous Goiter	25	20	05
Follicular Neoplasm	04	02	02
FVPTC	01	01	-
Total	30	23	07

Table 3: Distribution of Adenomatous Goiter cases according to Cytomorphological features

Cytological features	Parameters	No of cases	Percentage
Cellularity	High	21	47.7%
	Moderate	23	52.2%
Predominant pattern	Macrofollicular	14	31.8%
	Microfollicular	30	68.1%
Colloid	Scanty	10	22.7%
	Moderate	12	27.2%
	Abundant	22	50%
Macrophages	Present	19	43.1%
	Absent	25	56.8%
Hurthle cells	Present	18	40.90%
	Absent	26	59.09%

Table 4: Cytomorphological features of follicular neoplasm on FNAC

Case No	Cellularity	Macrofollicular pattern	Microfollicular pattern	Colloid	Hurthle cells	Nuclear features
1	High	Absent	Predominant	Absent	Absent	Nuclear crowding & overlapping
2	High	Absent	Predominant	Absent	Absent	Nuclear crowding & overlapping
3	High	Absent	Predominant	Absent	Absent	Nuclear crowding & overlapping
4	Moderate	Frequent	Absent	Scanty	Occasional	Mild anisonucleosis. Nuclear crowding
5	Moderate	Frequent	Absent	Scanty	Occasional	Nuclear crowding & overlapping

Table 5: Cytomorphological features of FVPTC on FNAC

Cellularity	Macrofollicular pattern	Microfollicular pattern	Colloid	Hurthle cells	Nuclear features
High	Absent	Predominant	Absent	Absent	Mild anisonucleosis. Prominent nucleoli, increased N:C ratio, intranuclear cytoplasmic inclusions, nuclear grooves, powdery chromatin.

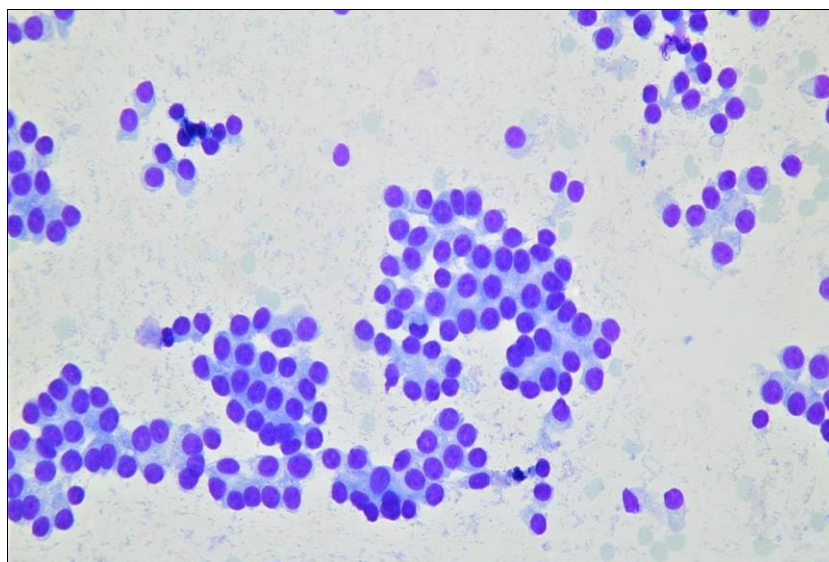


Fig 1: FNAC smears depicting abundant cellularity in a benign lesion of thyroid

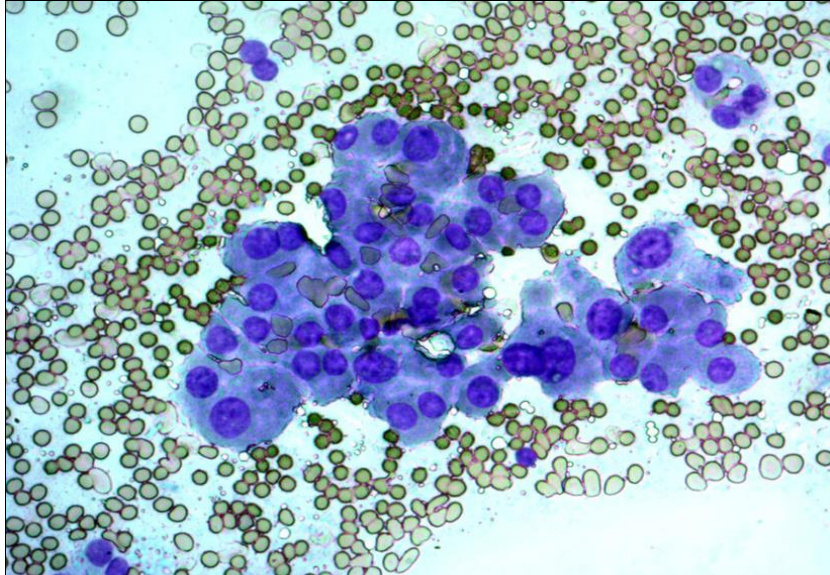


Fig 2: Follicular neoplasm (Hurthle cell type) demonstrating abundant cytoplasm, an enlarged nucleus and prominent nucleolus

Discussion

FNAC is a helpful tool in distinguishing neoplastic from non-neoplastic thyroid lesions. Meticulous examination of the pattern along with cellular details and background characteristics would be helpful in accurately diagnosing thyroid lesions. A thyroid lesion is designated as follicular when it almost or completely displays a follicular growth pattern or thyroid follicles with central lumen containing variable amounts of colloid. The differential diagnosis of thyroid FNAC specimens includes hyperplastic/adenomatous goiter, follicular adenoma and carcinoma and follicular variant of papillary thyroid carcinoma^[3]. They are diagnosed based on cytoarchitectural pattern, nuclear features, cytological atypia, and background colloid material.

In this retrospective study of 50 thyroid FNAC cases, the incidence of Adenomatous Goiter was 88% (44 cases) followed by Follicular Neoplasm 10% (05 cases) and Follicular Variant of Papillary Thyroid Carcinoma with 02% (01 case). [Table 1].

Out of 50 cases, histopathological correlation was available in 30 (60%) cases. [Table 2] On histopathological examination, concordance was seen in 23 cases (76.6%) and discordance in 7 cases (23.3%). Out of seven discordant cases, five cases diagnosed as AG on FNAC were reported as follicular adenoma & one case each diagnosed as FN on FNAC was Follicular adenoma and FVPTC on histopathology.

Adenomatous goiter

Adenomatous goiter in our study comprised the largest population of cases of follicular-patterned lesions with an incidence of 88% (44 cases) on FNAC. Cytological smears of the 44 cases of AG in the present study showed 23 cases (52.2%) with moderate cellularity and 21 cases (47.7%) had high cellularity. About 30 cases (68.1%) showed predominantly microfollicular pattern and 14 (31.8%) macrofollicular pattern 22 cases (50%) showed abundant colloid, 12 cases (27.2%) showed moderate colloid, and 10 cases (22.7%) had scanty colloid. Macrophages, including cyst macrophages and hemosiderin-laden macrophages, were seen in 19 cases (43.1%) and were absent in 25 (56.8%) cases. Hurthle cells were present in 18 cases

(40.9%) and were not seen in 26 cases (59.09%). Among the 25 cases of AG with high cellularity, background and accompanying components, such as abundant colloid, cystic changes, stromal fragments, and follicular cells in honeycomb arrangement were observed. These were labeled as benign lesions. Histopathological reports were available for 25 patients out of the total 50. Of these 25 cases, 20 were consistent with AG and 5 showed discordance. Of the five discordant cases, all were diagnosed as FA and (Table 3). Discordance in our cases might have occurred due to aspiration from colloid-rich macrofollicular areas of the neoplasm. This may be resolved by giving multiple passes through various sites of the lesion under ultrasound guidance.

Follicular neoplasm

Incidence of FN was 10% (5 cases) of the total 50 cases of follicular-patterned lesions. Among the five cases, three cases of FN showed high cellularity, predominant microfollicular and dispersed pattern, nuclear overlapping, and crowding with no colloid. Two cases showed moderately cellularity with macrofollicular pattern and scant colloid (Table 4). All these were diagnosed as FN on FNAC. Out of these five cases, histopathology was available in four case and was diagnosed as FA & FVPTC on histopathology.

Follicular variant of papillary thyroid carcinoma

The incidence of FVPTC was 2% (01 case) out of total 50 cases of follicular-patterned lesions. Smear examination of FVPTC case in this study showed high cellularity with predominantly microfollicular pattern, characteristic nuclear features of PTC, and absence of colloid. Histopathology was concordant in this case.

Conclusion

Fine needle aspiration cytology is a simple and inexpensive method of diagnosing non-neoplastic and neoplastic lesions of thyroid gland. As FNAC has low sensitivity for differentiating follicular adenoma from follicular carcinoma, histopathological examination remains the gold standard for differentiating these two lesions. One should carefully look for nuclear features specific for papillary thyroid carcinoma as they hold an important key in distinguishing benign and

malignant follicular-patterned lesions. Careful observation of the cell pattern along with cytomorphologic details and background material would classify the follicular patterned lesions into appropriate category.

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