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A Diagnostic Study of Utility of Fine Needle Aspiration Cytology and Cell Block Technique in Thyroid Lesions

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ABSTRACT:
Background and objectives: Thyroid lesions are one of the most common conditions all over the world, presenting as neck swelling. Lesions include inflammatory, hyperplastic and neoplastic with varied presentation, ranging from diffuse thyroid enlargement to solitary nodule and even multi nodular enlargement.
Objectives:
1. To study the efficacy of FNAC in diagnosis of thyroid lesions.
2. To study the efficacy of Cell Block in diagnosis of thyroid lesions.
3. To compare cell block and FNAC study in diagnosis of thyroid lesions.

Methods: The study population included all patients presenting with thyroid lesions at Basaweshwar Teaching and General hospital, Kalaburagi.
Results:
- Out of 55 cases of thyroid lesions maximum cases were in the age group of 31-40 years with mean age being 36 years.
- Male : Female ratio is 1:8.16
- Maximum cases were of multinodular goitre seen in 14 cases and all in females
- Among 55 cases, 46 cases were non neoplastic and 9 cases were neoplastic on FNAC.
- One multinodular goitre turned out to follicular neoplasm and one follicular neoplasm was diagnosed as Papillary carcinoma thyroid with the application of cell block technique in addition to FNAC.

Conclusion: This study proves that FNAC and cell blocks are sensitive, specific, and accurate as preliminary diagnostic tests for assessment of patients with thyroid lesions. Their concomitant use can reduce the number of patients with benign thyroid nodules undergoing unnecessary surgery and can aid in avoiding delays in planning of surgery in malignant cases.

Keywords: Thyroid lesions, Multinodular goitre, Follicular neoplasm, Papillary carcinoma thyroid.

INTRODUCTION:

In India 12.2% of the population has thyroid nodules, and the annual incidence of thyroid cancer is 8.7 per 1,00,000 individuals.[1]
Thyroid lesions can present in a various forms, including diffuse thyroid enlargement, a single nodule, or several nodules, and patients may be in euthyroid, hypothyroid, and hyperthyroid states. Thyroid disorders are caused by inflammatory, hyperplastic, and neoplastic etiology.[2]

FNAC is a cost-effective, quick, and safe technique with great patient compliance.[3]
However FNAC has a few limitations, like false positive or false negative results.[3]
FNAC is mainly an operator-dependent method. Procedure errors during sample collection, haemorrhagic or pauci-cellular aspirates, and wrongly collected lesions, particularly in the case of small swellings, may be to blame for inconclusive diagnoses on FNAC.[18]
The cell morphologic changes in smears are not usually visible in ordinary cytological work. Because it may be challenging to make decisions sometimes, the cell block may provide a clearer and better visual representation of the intricate architectural details. Employing immunocytochemical or histochemical staining has proven a helpful adjunct for making a more certain diagnosis.[19]

OBJECTIVES OF THE STUDY:
1. To study the efficacy of FNAC in diagnosis of thyroid lesions.
2. To study the efficacy of cell block in diagnosis of thyroid lesions.
3. To compare cell block and FNAC study in diagnosis of thyroid lesions.

METHODOLOGY:
The present study included 55 cases of thyroid lesions from Basaweshwara teaching and general hospital, attached to Mahadevappa Rampure medical college, kalaburagi.
Clinical, radiological and biochemical data was collected before performing the procedure.
Informed consent: Consent was taken from the patient or attenders in their own vernacular language.
Prior to aspiration, a physical examination was carried out to note the mobility of the thyroid during swallowing and the presence of any enlarged cervical lymph node. The patients were made to lie supine with their necks stretched up.
FNAC was performed under all aseptic precautions using, 22 G needle. The slides were air-dried and fixed in ethanol for Geimsa (MGG) staining and FNAC slides were reported as per Bethesda system for reporting thyroid cytology, 2017.
After preparing smears, clots or tissue remnants left in the hub of needles were removed cautiously with the help of another needle and rinsed in 60% ethanol followed by centrifugation of this material in a 10-mL disposable centrifuge tube at 1500 rpm for 20 minutes to form cell button. The supernatant fluid was decanted and the cell button formed was fixed in formalin and processed like a histopathological specimen. Later slides were stained with haematoxylin and eosin.

Results:
- Out of 55 cases of thyroid lesions maximum cases were in the age group of 31-40 years with mean age being 36 years.
- Male : Female ratio is 1:8.16
- Maximum cases were of multinodular goitre seen in 14 cases and all in females
- Among 55 cases, 46 cases were non neoplastic and 9 cases were neoplastic on FNAC.
- One multinodular goitre turned out to follicular neoplasm and one follicular neoplasm was diagnosed as Papillary carcinoma thyroid with the application of cell block technique in addition to FNAC.

TABLE 1: CLASSIFICATION OF TOTAL THYROID LESIONS BASED ON BETHESDA SYSTEM ON FNAC:

THYROID LESION	NUMBER OF CASES	BETHESDA CLASSIFICATION	PERCENTAGE
Colloid cyst	09	Category II	16.36%
Simple colloid goitre	10	Category II	18.18%
Multi nodular goitre	**14**	**Category II**	**25.45%**
Hashimoto's thyroiditis	13	Category II	23.63%
Follicular neoplasm	08	Category IV	14.54%
Papillary carcinoma thyroid	01	Category VI	1.82%
Total	55		100%

Out of 55 cases, maximum number of cases diagnosed were multinodular goitre i.e 14(25.45%) followed by Hashimoto's thyroiditis 13(23.63%).

TABLE 2: COMPARISON OF NUMBER OF CASES ON FNAC SMEARS AND CELL BLOCK DIAGNOSIS:

Category	**FNAC**	**Cell block**
	No. (%)	**No. (%)**
Non neoplastic	**46(83.64%)**	**45 (81.82%)**
Colloid cyst	09(16.36%)	10(18.18%)
Simple colloid goitre	10(18.18%)	09(16.36%)
Multi nodular goitre	14(25.45%)	13(23.64%)
Hashimoto's thyroiditis	13(23.65%)	13(23.64%)
Neoplastic	**9 (16.36%)**	**10(18.18%)**
Follicular neoplasm	08(14.54%)	08(14.54%)
Papillary carcinoma thyroid	01(1.82%)	02(3.64%)
Total	55 (100.0%)	55 (100.0%)

Study observed one discordant case, on FNAC total 46 cases were reported non neoplastic and 09 cases were reported as neoplastic. Whereas on cell block 45 cases were diagnosed as non neoplastic and 10 cases were reported neoplastic.

Discussion:

Thyroid is a highly vascular organ. Thyroid cancer is the most common endocrine malignancy comprising 0.1%–0.2% of all cancers in India with an age-adjusted incidence of 1 per 100,000 in males and 1.8 per 100,000 in females. [23,24]

Though thyroid malignancies are most common endocrine malignancies they have got good prognosis.[3]

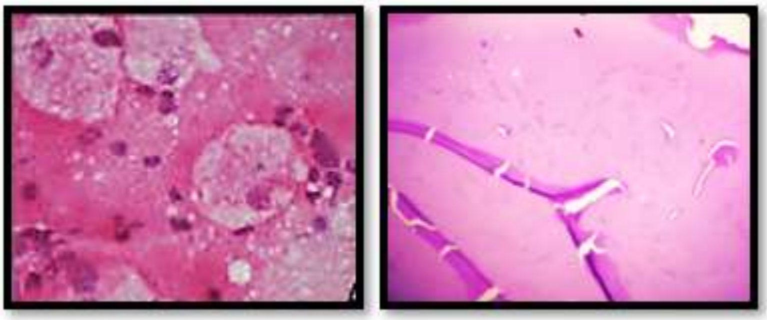
FNAC is one of the gold standard screening test in the evaluation of a thyroid nodule. It is cost-effective and safe procedure. Nevertheless, like any other test, fine needle aspiration has its limitations and diagnostic pitfalls.

Conventional FNAC for cystic thyroid nodules has a high rate of non-diagnostic and false negative resu-

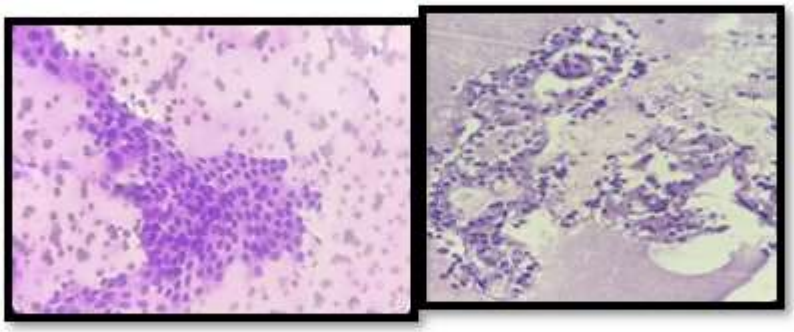
lts as it yields a large amount of fluid that cannot be processed. Cell block may resolve this problem, as a large amount of the fluid aspirated is centrifuged and cell block prepared from it.
Cell block has many advantages like it is cost effective and multiple sections of it can be given. It gives accurate and precise diagnosis. It preserves architectural pattern, three dimensional clusters and gives better nuclear and cytoplasmic details. Cell block also better delineates the few follicular cells that may appear within a large number of degenerated cells.
The biggest advantage is cell blocks can be used for a variety of histochemical stains and provides good material for insitu hybridisation.
A total of 55 cases of thyroid lesions referred for FNAC to department of Pathology, attached to Mahadevappa Rampure medical college were studied during a period of 2 years from August 2020 to July 2022.

CONCLUSION:
This study proves that FNAC and cell blocks are sensitive, specific, and accurate as preliminary diagnostic tests for assessment of patients with thyroid lesions. Their concomitant use can reduce the number of patients with benign thyroid nodules undergoing unnecessary surgery and can aid in avoiding delays in planning of surgery in malignant cases.
FNAC and cell block technique can be used together to increase the diagnostic accuracy of the thyroid lesions. Cell block preparation acts as an adjuvant to FNAC in establishing the more accurate diagnosis.
Cell block material facilitates diagnosis by increasing the diagnostic yield of the specimen and helps reduce repeat FNAC procedures. It affords additional information helpful in confirming and establishing the diagnosis of thyroid lesions by improving cellularity, maintaining cellular architecture
FNAC provided the pattern of arrangement of cells and distribution of colloid in the background whereas, cell block provided excellent cytomorphological features of the cells, nuclear details, pattern of chromatin and cytoplasmic details in arriving at a diagnosis.

PHOTOGRAPHS:



COLLOID CYST: FIG 1A: FNAC showing Abundant thick and thin colloid, scattered follicular epithelial cells and cyst macrophages.
Fig 1B: COLLOID CYST, CELL BLOCK. High power view, H&E stain.
Abundant thick and thin colloid.



COLLOID GOITRE,FIG 2A: MULTINODULAR GOITRE, FNAC: High power view, Giemsa stain. thick and thin colloid, monolayered sheets of follicular epithelial cells with bland nuclear features.
COLLOID GOITRE, Fig 2B: Cell block:
High power view, H&E stain.Nodular arrangement of follicular epithelial cells in colloid background.

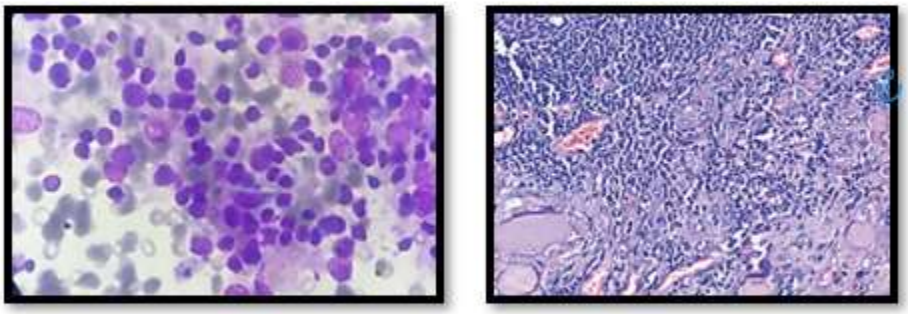


Figure 3A: HASHIMOTOS'S THYROIDITIS, FNAC: Oil immersion, Giemsa stain.
Follicular epithelial cells in clusters with mild anisonucleosis. Mature lymphocytes impinging on follicular epithelial cells. Lymphohistiocytes and epithelioid cells.
Figure 3B: HASHIMOTOS'S THYROIDITIS, CELL BLOCK: High power view, H&E stain.
Diffuse lymphoplasmacytic infiltration.

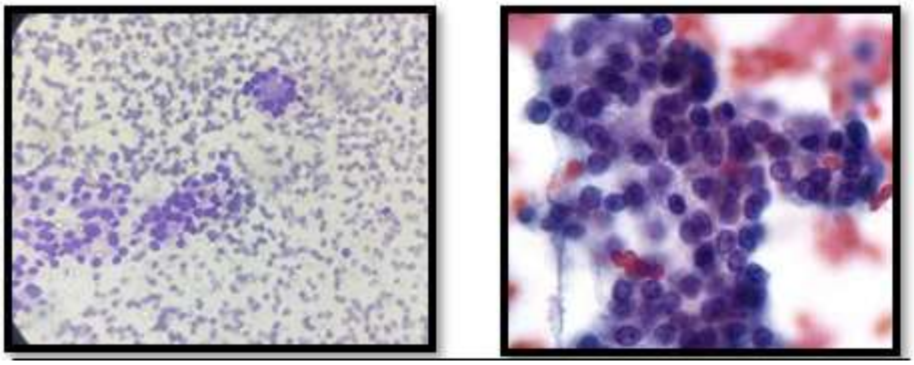


Figure 4A: FOLLICULAR NEOPLASM, FNAC: High power view, Giemsa stain.
Follicular epithelial cells in clusters forming acini/follicles in hemorrhagic and very scant colloid background.
Figure 4B: FOLLICULAR NEOPLASM, CELL BLOCK: OIL IMMERSION, H & E stain.
Follicular epithelial cells forming cluster showing hyperchromatic nucleus and anisonucleosis.

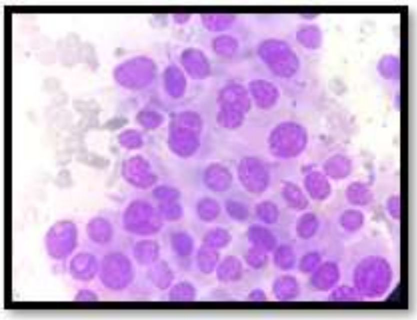
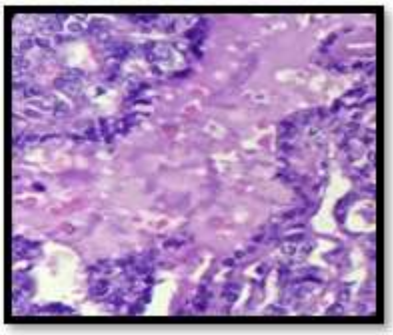
 

Figure 5A: PAPILLARY CARCINOMA THYROID, FNAC: OIL IMMERSION, Giemsa stain.
Large oval pale nuclei, several intranuclear cytoplasmic inclusions; pale powdery chromatin
Figure 6C: PAPILLARY CARCINOMA THYROID, CELL BLOCK: High power view, Follicular epithelial cells showing nuclear grooving and orphan annie eye nucleus with colloid areas.

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