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Comparison of Fine Needle Aspiration Cytology & Cell Block in Thyroid Pathology

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Abstract

Context: Accurate preoperative diagnosis of thyroid lesions is imperative and helps surgeons to decide the management of the patients. The differential diagnosis of these nodules includes from non neoplastic to malignant lesions. *Aims:* This study was conducted to assess the utility of cell blocks in hemorrhagic and cystic thyroid aspirations. *Settings and Design:* This was a prospective study conducted over a period of one year in the department of Pathology. *Methods and Material:* All Thyroid FNAs that yielded either blood tinged colloid or cystic fluid or hemorrhagic material were included in the Study. CBs were prepared from the residual material after preparation of smears. The cytomorphology of FNA smears were compared with histopathology of cell blocks in all cases. *Results:* Sensitivity, specificity, PPV, NPV of FNAC was 100%, 94.2%, 83.3%, 100% respectively. Percentage of false positive cases was 5.7% with diagnostic accuracy of 95%. In the present study Cell blocks were contributory to FNAC diagnosis in three cases (6%). *Conclusions:* Cell block preparation as an adjuvant to FNAC can reduce diagnostic pitfall and improve accuracy of FNA diagnosis. It gives an added opportunity to study architecture of the tissue. Cyto-histologic correlation in all cases may help to improve efficiency of Pathologists.

Keywords: FNAC; Cell Block; Thyroid Nodule; Cyto Histologic Correlation.

Introduction

Thyroid nodules are seen in about 12.2% of population in India and incidence of thyroid carcinoma is expected around 8.7 per 100000 people per year [1,2]. The differential diagnosis of these nodules includes from non neoplastic to malignant lesions. Non neoplastic lesions can be managed by conservative approach; however surgery is the treatment of choice for borderline, indeterminate and malignant nodules [3]. Hence accurate preoperative diagnosis of thyroid lesions is imperative to avoid unnecessary surgeries in these patients. The most widely used pre operative investigations are Fine Needle aspiration cytology (FNAC) and high resolution ultrasonography. According to previous studies the Sensitivity, specificity and diagnostic accuracy of FNAC ranges from 65 to 100 % [4]. The introduction of cell block (CB) as an adjuvant to FNAs can improve the accuracy of cytological diagnosis. This study was conducted to assess the utility of cell blocks in hemorrhagic and cystic thyroid aspirations.

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Methods and Materials

This was a prospective study conducted over a period of one year in the department of Pathology at Srinivas Institute of Medical Sciences and Research Centre, Mangalore, Karnataka. All Thyroid FNAs that yielded either blood tinged colloid or cystic fluid or hemorrhagic material were included in the Study. FNA was performed under aseptic precautions using 23 or 24 gauge needle attached to 5ml syringe. 4-5 smears were prepared from the aspirate, two to three smears were immediately fixed in 95% ethanol and stained with Hematoxylin and Eosin stain and Papanicolaou

stain, remaining slides were air dried and stained with Leishman stain. CBs were prepared from the residual material after preparation of smears. To prepare CB remaining material was put in a 10ml test tube; needle was rinsed in 95% ethanol and any blood clot or tissue particles at the needle hub was picked from another needle and put in the test tube. Ten ml of 10% alcohol formalin was added to the test tube fixed for one hour, following which it was centrifuged for 5minutes at 3000 rpm. Supernatant fluid was discarded, 10% formalin was added to the cell button and kept for fixation for 10-12 hours and then paraffin blocks were prepared like any other tissues. Four to Six microns thick sections were cut in a microtome and sections were stained with Hematoxylin and eosin stain. If the cell button formed after centrifugation was small, a few drops of thromboplastin was put to make it firm and processed in the same manner [5,6]. The cytomorphology of FNA smears were compared with histopathology of cell blocks in all cases.

Results

Of the fifty thyroid cases: 12 were diagnosed as neoplastic lesions on FNAC. Papillary carcinomas were 4, Follicular neoplasms were 6, and two were reported as suspicious of malignancy. The remaining 38 cases included 22 nodular colloid goiters, 8 colloid cysts, 3 Hashimotos thyroiditis and 5 were inadequate for reporting.

Table 1: Correlation of FNAC and Cell block diagnosis in 50 cases

FNAC Diagnosis	Number	Cell Block Diagnosis	Number
Papillary Carcinoma	4	Papillary Carcinoma	4
Follicular Neoplasm	6	Follicular Neoplasm	5
		Nodular colloid goiter	1
Suspicious for Malignancy	2	Anaplastic Carcinoma	1
		Nodular Colloid Goiter	1
Colloid Cyst	8	Colloid Cyst	8
Nodular colloid goiter	22	Nodular colloid goiter	22
Hashimotos Thyroiditis	3	Hashimotos Thyroiditis	3
Inadequate sample	5	Nodular Colloid Goitre	1
		Inadequate	4
Total	50		50

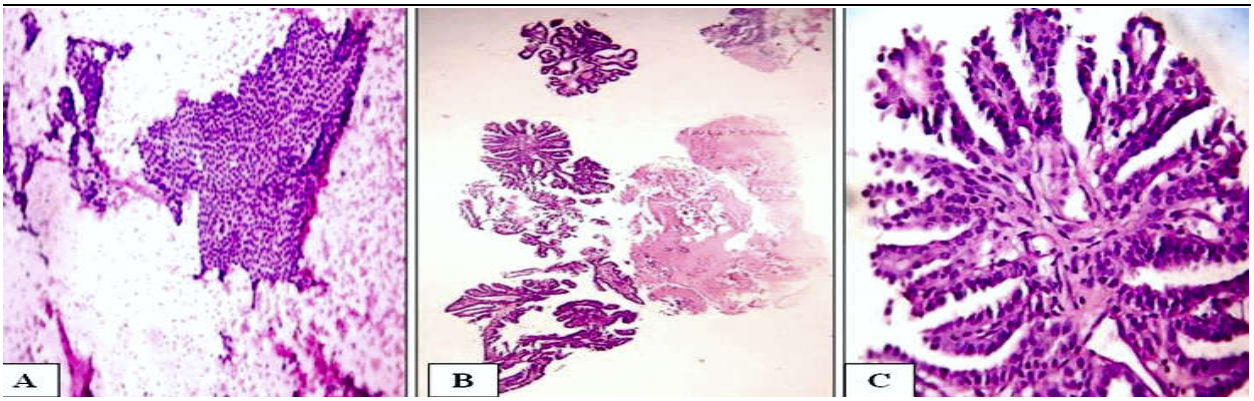

Fig. 1: Papillary Carcinoma: A. FNA Smear, B & C. Cell Block (Low & High Power)

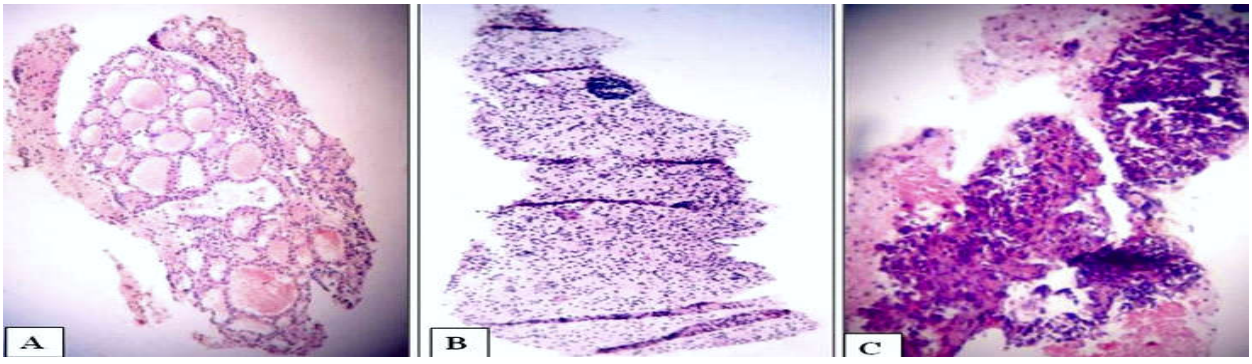

Fig. 2: Cell Blocks showing A) Nodular Goiter, B) Hashimoto Thyroiditis, C) Anaplastic Carcinoma

The histopathological diagnosis of CBs was correlating with FNA smears except in three cases. Two cases, one follicular neoplasm and another suspicious of malignancy turned out to be colloid goiters on CB. One case which had no cells in the smears showed few benign clusters of thyroid follicular cells in cell block (Table1). Sensitivity, specificity, PPV, NPV of FNAC was 100%, 94.2%, 83.3%, 100% respectively. Percentage of false positive cases was 5.7% with diagnostic accuracy of 95%.

Discussion

Thyroid and Lymphnodes are the common organs which are requested for FNAC among the Head and neck swellings. Thyroid having rich blood supply most of the times yields hemorrhagic aspirate which clots immediately and hampers smearing. Cystic change in multinodular goiter or neoplastic nodule may yield cystic fluid on FNAC. In the present study the residual material from hemorrhagic or cystic fluid was used to prepare CB and usefulness of CB was analyzed by cyto histological correlation.

Out of 50 cases studied, 12 were neoplastic, 33 non neoplastic and 5 inadequate or nondiagnostic. In a study conducted by Sanchez N and Selvaggi SM [7] 23/82 were neoplastic, 51/82 were non neoplastic and 8/82 nondiagnostic. Of the 12 neoplastic cases, papillary carcinoma were 4, follicular neoplasm were 6 and 2 were reported as suspicious of malignancy. Basnet S and Talwar OP [8] reported 8/12 papillary carcinoma, 2/12 follicular neoplasm, and 2/12 Anaplastic carcinoma in their study.

Four cases were given the diagnosis of papillary carcinoma on FNAC and Cell block (Figure 1). Follicular cells were arranged in monolayered sheets, clusters and finger like projections in the smears. True papillae with fibrovascular core were appreciated on CB. Nuclear grooves were better seen on smears whereas nuclear pseudo inclusions were clearly seen in cell blocks. One case had better cell yield on CB compared to smears. Cell block gives an added opportunity to study cyto morphology and histology pattern of the lesion simultaneously and this may help in improving diagnostic efficiency of pathologists.

One case which was diagnosed as follicular neoplasm turned out to be colloid goiter on cell block (Figure 2A). Histopathology showed two relatively defined nodules of varying sized follicles distended with colloid. USG neck in this case was also suggesting multinodular goiter. Follicular neoplasm and adenomatoid goiter is difficult to differentiate on cytology. Clinical and radiological correlation is a must in these cases.

Two cases were given the report of suspicious for malignancy of which one turned out to be colloid goiter on cell block. Smears had shown few clusters with overlapping, hyperchromatic nucleus and nuclear grooves. The other one was diagnosed as Anaplastic carcinoma (Figure 2C). Hegazy RA & Hegazy AA accounted similar findings in their study on 85 thyroid FNA with CBs [9]. Similar to other studies degenerated follicular cells and plasma cells were seen in CB of Hashimotos thyroiditis (Figure 2B).

In the present study Cell blocks were contributory to FNAC diagnosis only in three cases (6%). Nassar and colleagues also found that CB slides were diagnostic only in 6.1% of the cases [10]. Sanchez N and Selvaggi SM found CB to be contributory in 25 (31%) cases.

In the present study sensitivity, specificity, PPV, NPV of FNAC was 100%, 94.2%, 83.3%, 100% respectively. Percentage of false positive cases was 5.7% with diagnostic accuracy of 95%. Previous studies have shown sensitivity and specificity ranging from 98% to 95% [7,11].

Though cell blocks were helpful only in minority of cases, it is always preferable to prepare cell blocks especially in fluid and hemorrhagic aspirate because all the material that is aspirated is processed and studied in cell block unlike cytology where 4-5 smears are only prepared and rest of the material is wasted, Cell blocks can be preserved for future reference and ancillary tests like immunohistochemistry & special stains can be performed if required. They will serve as study material for teaching purpose; will have opportunity to study cytology and histology patterns of the lesions simultaneously.

Conclusion

Cell block preparation as an adjuvant to FNAC can reduce diagnostic pitfall and improve accuracy of FNA diagnosis. It gives an added opportunity to study architecture of the tissue. Cyto-histologic correlation in all cases may help to improve efficiency of Pathologists.

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