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A CELL PATTERN APPROACH FOR INTERPRETATION OF FINE NEEDLE ASPIRATION CYTOLOGY OF THYROID LESIONS USING THE BETHESDA SYSTEM: A TERTIARY CARE CENTRE STUDY WITH LITERATURE

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ABSTRACT: INTRODUCTION: Fine needle aspiration of thyroid lesions has proven to be an important, simple, safe, cost effective and accurate method for diagnosing the various thyroid lesions. Multiple organizations have proposed diagnostic guidelines for reporting thyroid cytology. National Cancer Institute (NCI) organized the NCI Thyroid Fine Needle Aspiration State of the Science conference in 2007 and proposed the Bethesda System for reporting Thyroid Cytopathology (TBSRTC). The aim of the study is to highlight the application of new nomenclature which can improve inter-laboratory agreement thus leading to more consistent management approach.

MATERIALS AND METHODS: The present study was done on 91 random FNAC cases of thyroid lesions in Pathology Department, SGRDIMSAR. The cases were classified according to 6 levels of TBSRTC which are DC-I: Non diagnostic, DC-II: Benign, DC-III: atypia/follicular lesion of undetermined significance (AUS/FLUS), DC-IV: Follicular neoplasm/suspicion for a follicular neoplasm (FN/SFN), DC-V: suspicious for malignancy and DC-VI: Malignant **RESULTS:** In the present study females outnumbered males with the ratio of 5:1. The age group varied from 13-80 years with maximum number of cases in 3rd and 4th decade. Maximum numbers of the cases (48.5%) were benign followed by FN/SFN and malignant category constituting 20.8% and 12.2% respectively. 8.7% were classified under AUS/FLUS category, 6.5% as non-diagnostic and 3.3% as suspicious of malignancy. **CONCLUSION:** The management of thyroid lesions has been complicated by the lack of universal terminology. TBSTRC is an effective thyroid FNA classification to guide clinical management of patients with thyroid nodules. Its implementation should be encouraged in our country because of its easy understandability and reproducibility.

KEYWORDS: Thyroid, Fine needle aspiration, FNA, Bethesda classification.

INTRODUCTION: Fine needle aspiration (FNA) of thyroid gland is a widely accepted, simple, safe, cost-effective and accurate method for the evaluation of thyroid lesions.¹ Clinical evaluation, imaging including ultrasound and FNA are mainstay for evaluation of thyroid lesions patients. Among all, highest rate of detection of thyroid neoplasm arising in solitary nodule is achieved by cytological studies thus forming FNAC the most sensitive and specific test.² So FNAC provides information that guides the management of the patients with thyroid nodules by identifying the patients who require the surgical intervention.³

Various cyto morphological features including predominant cell pattern, cell morphology, background and marginal vacuoles are taken into account for diagnosing various lesions.⁴ The clinical management of lesions has been complicated by the lack of universal terminology.

ORIGINAL ARTICLE

The lack of standardization in the various diagnostic guidelines proposed in the past has led to confusion and frustration to treating physicians. There had been variability in the terminology used from one pathologist to other and also from one institution to other.^{5,6}

In 2007, the National Cancer Institute (NCI) organized the NCI Thyroid Fine Needle Aspiration State of the Science Conference and proposed the Bethesda System for reporting Thyroid Cytopathology (TBSRTC).⁷ TBSRTC describes 6 diagnostic categories of lesions: DC-I: Non diagnostic, DC-II: Benign, DC-III: atypia/follicular lesion of undetermined significance (AUS/FLUS), DC-IV: Follicular neoplasm/suspicion for a follicular neoplasm (FN/SFN), DC-V: suspicious for malignancy and DC-VI: Malignant.

Table 1:

The Bethesda System for Reporting Cytopathology: Recommended Diagnostic Categories:

- I. Non-diagnostic or unsatisfactory.
 - Cyst fluid only.
 - Virtually acellular specimen.
 - Other (Obscuring blood, clotting artifact, etc)
- II. Benign.
 - Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid, etc)
 - Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context
 - Consistent with granulomatous (subacute) thyroiditis.
- III. Atypia of undetermined significance/follicular lesion of undetermined significance.
- IV. Follicular neoplasm/ "suspicious" for follicular neoplasm Specify if Hurthle cell type.
- V. Suspicious for malignancy.
 - Suspicious of papillary carcinoma.
 - Suspicious for medullary carcinoma.
 - Suspicious for metastatic carcinoma.
 - Suspicious for lymphoma.
- VI. Malignant.
 - Papillary thyroid carcinoma.
 - Poorly differentiated carcinoma.
 - Medullary thyroid carcinoma.
 - Undifferentiated (anaplastic) carcinoma.
 - Squamous cell carcinoma.
 - Carcinoma with mixed features.
 - Metastatic.

The present study was done on 91 random FNAC cases of thyroid lesions which were classified according to the Bethesda System for Reporting Thyroid Cytopathology (TBSRTC). The aim of the study was to highlight the application of new TBSRTC nomenclature which can improve inter-laboratory agreement thus leading to more consistent management approach.

ORIGINAL ARTICLE

MATERIAL AND METHODS: This study was conducted in the Department of Pathology, SGRDIMSAR on 91 random FNAC cases of thyroid lesions. The FNAs were classified according to 6 levels of TBSRTC.

The findings were correlated with relevant clinical and radiological data provided. Cases using descriptive diagnosis were placed into the best overall categories. Later on, histopathological correlations were done in the cases where it was possible.

RESULTS: In the present study, female patients outnumbered males with a ratio of 5:1. 76/91 (83%) cases were females and 15/91 (17%) were male patients. Age group varied from 13-80 years of age with maximum number of cases in the third and fourth decade.

The maximum numbers of cases were classified under the benign category 44/91 (48.5%). This was followed by FN/SFN and malignant category consisting 20.8% (19/91) and 12.2% (11/91) respectively. Eight out of ninety one cases (8.7%) were classified as AUS/FLUS. Non-diagnostic cases constituted 9/91 (6.5%) of total cases. 3 cases (3.2%) accounted for suspicious of malignancy category (Table 2).

Category		Percentage prevalence
ND	06	6.5
Benign	44	48.5
AUS/FLUS	08	8.7
FN/SFN	19	20.8
SUS	03	3.3
Malignant	11	12.2
Total	91	100

Table 2: Classification of thyroid lesions according to the categories described in the Bethesda System of Reporting Thyroid Cytology (TBSRTC)

Fifteen cases of cytologically diagnosed follicular neoplasms were confirmed by histopathology, among them two were follicular carcinoma. Discordance with histopathology was seen in four cases of cytologically diagnosed Follicular Neoplasm (FN). Out of these, two were confirmed as Follicular variant of papillary carcinoma thyroid and two as hyperplastic nodule in nodular goiter. All cytologically diagnosed papillary carcinoma were in concordance with histopathology. Of the eight cases in category AUS/FLUS, histopathology of four cases was available. 3 were diagnosed as hyperplastic nodule in nodular goiter and one was as Follicular Adenoma.

DISCUSSION: Interpretation of thyroid FNAC is challenging and is made more complex due to the use of personalized, local, institutional terminologies.⁸ These terminologies varied from pathologist to pathologist and institution to institution and has led confusion and frustration among treating physicians. Benign thyroid lesions have been given as colloid goiter, adenomatous goiter, hyperplastic nodule and colloid cyst.⁶

ORIGINAL ARTICLE

Multiple organizations have proposed diagnostic guidelines for reporting thyroid FNAC to standardize the thyroid cytology reporting. In 2007, National Cancer Institute (NCI) organized the NCI Thyroid Fine Needle Aspiration State of the science Conference which led to formation of universal reporting system- The Bethesda System for Reporting Thyroid Cytopathology.^{7,9,10}

In our study, female patients were five times the male patients and is consistent with findings in previous studies.^{2,4} Age group varies from 13-80 years and similar findings have been observed by other researchers.^{2,4}

The maximum number of cases were classified in benign category (48.5%) followed by FN/SFN and malignant category constituting 20.8% and 12.2% respectively. This is in concordance with the observation of other authors where the incidence of Benign Lesions varied from (54-66%), FN/SFN (9.7-15%), malignant (5-10%).^{11,12,13} The AUS/FLUS shows a wide variability (range of 7-18%) in different studies. In our study this category constituted 8.7%.¹⁰

Fifteen cases of cytologically diagnosed follicular neoplasms were confirmed by histopathology; among them two were follicular carcinoma with concordance rate of 79%. Discordance with the histopathology was seen in four cases. Out of these, two were diagnosed follicular variant of papillary carcinoma thyroid and other two as hyperplastic nodule in nodular goiter. All the cytologically diagnosed papillary carcinoma were proved by histopathology (Concordance rate=100%). These findings corroborates with the work done by other authors.^{3,14} Of the eight cases in category of AUS/FLUS, histopathology of four cases were available. 3 were diagnosed as hyperplastic nodule in nodular goiter and one as follicular adenoma. Maximum interobserver variation and cyto-pathological discordance occur in this group.^{3,10,15}

The malignancy risk varies from 10-17% in this category.^{3,15} Various studies have highlighted that presence and number of micro follicular structures on cytology may warrant this inter observer discrepancy.¹⁶ So care should be taken in interpretation and rates of AUS/FLUS category should not exceed recommended target of 7%.^{3,16}

It is concluded that the management of thyroid lesions has been complicated by the lack of universal terminology. The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) is an effective thyroid FNA classification to guide clinical management of patients with thyroid nodules. Its implementation should be encouraged in our country because of its easy understandability and reproducibility.

ORIGINAL ARTICLE

Fig. 1: Category-Benign (Hashimotos thyroiditis) - MGG (400X).

Fig. 2: Category-Atypia of undetermined significance/Follicular lesion of undetermined significance (AUS/FLUS) - MGG (100X).

Fig. 1, 2

Fig. 3: Category-Follicular Neoplasm (FN/FSN) - MGG (400X)

Fig. 4: Category-Malignant [Papillary Carcinoma with presence of intranuclear inclusions (arrow)]- MGG (400X).

Fig. 3, 4

Cytomorphological findings seen in various categories of The Bethesda system of reporting thyroid cytopathology (TBSRTC).

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ORIGINAL ARTICLE

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ORIGINAL ARTICLE

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