Comparative reporting of thyroid cytology using Bethesda system with that of conventional system

Authors
Rakesh Mehar, Sonal Meshram, Meena Mittal*
Mahatma Gandhi Memorial Medical College Indore
*Corresponding Author
Dr Meena Mittal
Email: meenamittal10@gmail.com

Abstract

Background: Recent Bethesda System (2017) for reporting of thyroid lesion (TBSRTC) in cytopathology (FNAC) has attempted standardize the diagnostic approach. A uniform reporting system for thyroid FNA will facilitate effective communication among health care providers which helps in reducing the number of unnecessary thyroidectomies.

Aims and Objectives: To evaluate the cases according to Bethesda system and compare the result with conventional system.

Material and Methods: A retrospective study on FNAC thyroid was performed in M.G.M Medical College and M.Y. Hospital which included 500 cases which were reported from May 2013 to May 2018. For cytomorphological analysis of smears with Papanicolaou stain were reviewed and cases were categorized into six Bethesda categories.

Results: Females were more than males with a ratio of 7:1, age ranged between 20 years to 70 years. 26 cases (5.2%) categorized as nondiagnostic/ unsatisfactory samples, 396 (79.2%) as benign, and 28 (5.6%) as atypia of undetermined significance/ atypical follicular lesion of undetermined significance (AUS/AFLUS), 8(1.6%) as follicular neoplasm/ suspected follicular neoplasm (FN/SFN), 7 (1.4%) as suspicious for malignancy, and 35 cases (7%) as malignant. Reporting thyroid cytopathology per Bethesda system increases sensitivity, specificity, accuracy of thyroid cytopathology, increases understanding of reporting system by clinician, improves management plans, and reducing

Conclusion: Bethesda system of reporting can effectively determine which patients needed surgery/follow-up FNAC. TBSRTC may be used as national standardized terminology for thyroid reporting. The clinicians should be encouraged to embrace this procedure in the initial management of such patients.

Keywords: Fine needle aspiration cytology, Conventional System, thyroid lesion, Bethesda system.

Introduction

FNAC from thyroid lesion is an important procedure in the management of different thyroid conditions[1-4]. It is a minimally invasive, cost effective so it can performed as an outpatient technique, which is helpful in differentiating between benign and malignant lesion. There by reducing unnecessary surgeries[1,2]. It tells about the risk of malignancy, and gives the idea about the management of thyroid lesions as per
TBSRTC\textsuperscript{[5]}. Recent Bethesda System (2017) for reporting of thyroid lesion (TBSRTC) in cytopathology has been divided in to six categories seen in Table 1-

| Diagnostic Category | Risk of Malignancy | Usual Management |
|---------------------|--------------------|-----------------|
| 1. Non-diagnostic or unsatisfactory (ND/UNS); a. Fluid only (cyst). b. Acellular specimen c. Others (clotting artifact, obscuring blood, etc.) | 0 – 3% | Repeat FNA under ultrasound guidance |
| 2. Benign; a. Adenomatoid nodule. b. Colloid nodule etc.) c. Lymphocytic (Hashimoto) thyroiditis. d. Granulomatous (subacute) thyroiditis. e. Others | | Follow-up clinically |
| 3. Follicular lesion of undetermined significance or Atypia of undetermined significance or (AUS/FLUS) | 5 – 15% | Repeat FNAC |
| 4. Suspicious of follicular Neoplasm or follicular neoplasm (FN/SFN). Specify if Hurtle cell (oncocytic) type. | 15- 30% | Surgical lobectomy |
| 5. Suspicious for malignancy (SFM) including; a. Papillary carcinoma b. Medullary carcinoma c. Metastatic carcinoma d. Lymphoma e. Others | 60 – 75% | Surgical lobectomy or Near-total thyroidectomy |
| 6. Malignant, including; a. Papillary thyroid carcinoma. b. Medullary thyroid carcinoma. a. Poorly differentiated carcinoma b. Undifferentiated (anaplastic) carcinoma c. Carcinoma with mixed features (specify). d. Squamous cell carcinoma. e. Non-Hodgkin lymphoma. f. Metastatic carcinoma. g. Others. | 97 – 99% | Near total thyroidectomy |

Different methods have been used all over the world for reporting thyroid FNAC, ranging from two to six or more categories. Two category systems differentiates benign and malignant categories only. Other category systems are more difficult like; inconclusive, equivocal, atypical, indeterminate, uncertain, suspicious of malignancy, possible malignant, and probable malignant\textsuperscript{[6]} Clinicians find more difficulty in the interpretation of these reports and making plans for management\textsuperscript{[7-10]}. The main purpose of this study is to standardize reporting of thyroid cytopathology as per Bethesda system for reporting thyroid cytopathology (TBSRTC). This system is composed of six categories including: The non-diagnostic, the benign, the atypia of undetermined significance/atypical follicular lesion of undetermined significance (AUS/ AFLUS), the follicular/ Hürthlecell neoplasm/ suspicious of follicular neoplasm (FN/SFN), the suspicious of malignancy (SFM), and the malignant\textsuperscript{[11,12]}.

**Material and Methods**

A retrospective study of already diagnosed cases of thyroid in FNAC was performed in M.G.M Medical College and M.Y. Hospital which included 500 cases which were reported from May 2016 to May 2018. The data was retrieved from the records, maintained in the department includes
age, sex, clinical findings, radiological findings. For cytomorphological analysis of smears with Papanicolaou stain were reviewed and cases were categorized into six Bethesda categories.

**Statistical Evaluation**
The agreement between two pathologists is assessed with Cohen Kappa statistics, Kappa value is found 76% shows the degree of agreement between two pathologists is good.

**Results**
Females were more than males with a ratio of 7:1, age ranged between 20 years to 70 years.

**Figure 1: Sex distribution**

| Sex distribution |
|------------------|
| MALE | FEMALE |
| 60   | 440    |

**Table 2: Age distribution**

| Age         | No. of cases |
|-------------|--------------|
| 20-30 year  | 113          |
| 31-40 year  | 103          |
| 41–50 year  | 109          |
| 51–60 year  | 97           |
| 61–70 year  | 78           |

**Table 3: Cytopathological findings according to Bethesda System**

| Categories                                      | Name                                                       | No. of cases |
|------------------------------------------------|------------------------------------------------------------|--------------|
| Category 1                                     | Undiagnosed/Unsatisfactory                                  | 26(5.2%)     |
| Category 2                                     | Benign                                                     | 396(79.2%)   |
| Category 3                                     | Atypia of Undetermined signficance/Atypical follicular lesion of undetermined significance | 28(5.6%)     |
| Category 4                                     | Follicular neoplasm/Suspicious of follicular neoplasm       | 8(1.6%)      |
| Category 5                                     | Suspicious of malignancy                                   | 7(1.4%)      |
| Category 6                                     | Malignancy                                                 | 35(7%)       |

**Table 4: Comparison of conventional and TBSRTC (BETHESDA) System**

| Diagnosis on TBSRTC | Diagnosis on conventional | Non Diagnostic/Unsatisfactory | Benign | Atypia of Undetermined significance/Follicular lesion of undetermined significance | Follicular neoplasm/Suspicious for follicular neoplasm | Suspicious of malignancy | Malignancy | Total |
|---------------------|---------------------------|-------------------------------|--------|-----------------------------------------------------------------------------------|-------------------------------------------------------|--------------------------|-----------|-------|
| Inadequate          |                           | 18                            | 0      | 0                                                                                 | 0                                                     | 0                        | 0          | 18    |
| Benign              |                           | 08                            | 396    | 1                                                                                 | 0                                                     | 0                        | 0          | 406   |
| Equivocal           |                           | 0                             | 0      | 22                                                                               | 0                                                     | 7                        | 0          | 29    |
| Follicular Neoplasm |                           | 0                             | 0      | 0                                                                                 | 7                                                     | 0                        | 0          | 7     |
| Malignancy          |                           | 0                             | 0      | 5                                                                                 | 0                                                     | 0                        | 35         | 40    |
| Total               |                           | 26                            | 396    | 28                                                                               | 8                                                     | 7                        | 35         | 500   |

Malignancy was found in 35 patients in both Bethesda and conventional method, benign lesion was found in 396 patients in both conventional and Bethesda system.

**Table 5: Diagnostic Accuracy**

|               | TBSRTC | CONVENTIONAL | ACCURACY(%) |
|---------------|--------|--------------|-------------|
| Benign        | 396    | 406          | 97.5        |
| Malignant     | 35     | 40           | 87.5        |

Maximum accuracy found in benign lesion.
26 cases (5.2%) categorized as non diagnostic/unsatisfactory samples, 396 (79.2%) as benign, and 28 (5.6%) as atypia of undetermined significance/ataypical follicular lesion of undetermined significance (AUS/AFLUS), 8 (1.6%) as follicular neoplasm/suspected follicular neoplasm (FN/SFN), 7 (1.4%) as suspicious for malignancy, and 35 cases (7%) as malignant. Reporting thyroid cytopathology per Bethesda system increases sensitivity, specificity, accuracy of thyroid cytopathology, increases understanding of reporting system by clinician, improves management plans.

Figure 2: Cytopathological Finding

- Figure 3: Clusters of follicular epithelial cells with bland nuclei and adequate cytoplasm (suspicious follicular neoplasm)
- Figure 4: Clusters of few follicular cells and few oxyphilic cells and collection of lymphocytes (Hashimoto thyroiditis)
- Figure 5: Granuloma comprising epitheloid, lymphocytes, fibroblasts and clusters of follicular epithelial cells features are of granulomatous thyroiditis
Figure 6: Clusters of follicular epithelial cells against colloidal background

Discussion
On comparing results of benign and malignant categories in this study with other international studies there were no great differences in rate of benign and malignant conditions in most of these studies. The great differences were in cases intermediate between benign and malignant condition and in their reporting by cytopathologist and management by clinicians. Studies by Heydar Ali Esmaili et al\textsuperscript{[14]}, and Jogai et al\textsuperscript{[15]}, showed benign thyroid lesions constituting 64.3%, and 33.1% of studied cases, while malignant cases 7.8% and 19.5% respectively. The results of studies by Mehrali Rahimi et al\textsuperscript{[16]}, Santosh Kumar Mondal et al\textsuperscript{[17]} were high for benign conditions 90.3%, and 80%, low for malignant 9%, and 6% respectively. In the studies by Richa Sharma et al\textsuperscript{[18]}. Bethesda System for Reporting Thyroid Cytopathology is a comprehensive system for cytopathological diagnosis of thyroid nodule(s) and with strict diagnostic criteria for each category, predicting risk of malignancy and guidelines for planning of further management. In the present study, the number of benign cases reported by TBSRTC system were 396 (79.2%), while malignant cases were 35(7%), and remaining other categories were 13.8% collectively, in our study we found that the accuracy in malignant finding is 87.5% while in benign finding 97.5% . Bethesda System for Reporting Thyroid Cytopathology is a comprehensive system for cytopathological diagnosis of thyroid nodule(s) and with strict diagnostic criteria for each category, predicting risk of malignancy and guidelines for planning of further management.

Table 6: Few similar studies using TBSRTC showing category wise distribution of cases of all the FNAC

|                    | Present study | Her-Juing Wu | Theoharis | Bongiovanni |
|--------------------|---------------|--------------|-----------|-------------|
| Category 1         | 26(5.2%)      | 278(20.1%)   | 357(11.1%)| 3271(12.9%) |
| Category 2         | 396(79.2%)    | 539(39.0%)   | 2368(73.8%)| 15104(59.3%)|
| Category 3         | 28(5.6%)      | 376(27.2%)   | 95(3.0%)  | 2441(9.6%)  |
| Category 4         | 8(1.6%)       | 116(8.4%)    | 176(5.5%) | 2571(10.1%) |
| Category 5         | 7(1.4%)       | 36(2.6%)     | 43(1.4%)  | 680(2.7%)   |
| Category 6         | 35(7%)        | 37(2.7%)     | 168(5.2%) | 1378(5.4%)  |
| Total FNACs        | 500(100%)     | 1382(100%)   | 3207(100%)| 25,445(100%)|

Conclusion
Bethesda system of reporting can effectively determine which patients needed surgery/follow-up FNAC.TBSRTC may be used as national standardized terminology for thyroid reporting .The clinicians should be encouraged to embrace this procedure in the initial management of such patients.

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