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FINE NEEDLE ASPIRATION CYTOPATHOLOGY (FNAC) OF THYROID LESIONS REPORTING AS PER GUIDELINES OF RECENT BETHESDA SYSTEM AT A TERTIARY CARE TEACHING MEDICAL COLLEGE & HOSPITAL

Pathology

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ABSTRACT

Introduction: Estimation of accuracy of fine needle aspiration cytopathology (FNAC) of thyroid in diagnosis of different thyroid lesions, and evaluation of the value of reporting FNAC per guidelines of Bethesda system in reducing the number of un necessary thyroidectomies. This is a case control prospective study conducted on 54 patients with thyroid nodules. Patient were recruited to Cytopathology Department, KIMS Teaching Hospital in the period from January 2017 to December 2018. Results of FNAC were reported per recent Bethesda System for Reporting of Thyroid Cytopathology (TBSRTC). Reporting of Thyroid Cytopathology (TBSRTC) diagnoses were determined to be very useful for surgical removal thyroid tissues.

Methods: The current study was a retrospective study on 54 patients with thyroid swelling referred to the Department of Pathology, Karpaga Vinayaga Hospital in the period from January 2017 to Dec 2018. Cases included in the present study were those with preoperative FNAC and The data of 54 cases with enlarged thyroid glands that were referred to our cytolaboratory in this period. Thyroid swellings were aspirated using disposable needles using standard procedures. The aspirated contents of needles were expelled onto the glass slides. Slides were immediately fixed in methanol and smears were stained with papanicolau and hematoxlin and eosin stains whereas slides were air dried before staining it with giemsa

Results: Out of 54 cases, Bethesda category I included 3 cases (5.5%), category II constituted 42 cases(77.7%) out of which 22 cases (52.38%) were benign follicular nodule type II, 13 cases(30.95%) were colloid nodule, 7 cases (16.7%) were hashimoto thyroiditis, category III (AUS) included 2 cases (3.70%), category IV (Follicular Neoplasm) had 4 cases(7.40%), category V (Suspicious of malignancy) included 2 cases (3.70%), category VI (malignant) constituted 1 case (1.85%). Male to female ratio was 1:6.9. Highest prevalence was noted in 30-40 years of age.

Conclusion: Fine needle aspiration cytopathology from thyroid nodule(s) is a safe, quick outpatient, cost effective and easy procedure if done by expert hands, but it needs a unified system of interpretation, reporting language and guidelines for proper categorization and management. 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. Thyroid Fna can play a pivotal role in the management of patients with thyroid nodules by Bethesda system directly confers risk of malignancy in each category which in turn prompts the recommended clinical management of that category thus establishing an excellent clinico-pathological corelation. providing clinicians with a clear and comprehensible cytopathology reports. The Bethesda system is very useful for a standardized system of thyroid cytopathology reporting, best communication between clinicians and cytopathologists , leading to more consistent management approaches.

KEYWORDS

Thyroid FNAC, TBSRTC, Bethesda system

INTRODUCTION

Thyroid fine needle aspiration cytology (FNAC) has been an effective tool for the evaluation of thyroid diseases and thyroid nodules .It reduces the rate of unnecessary thyroid surgery for patients with benign nodules and appropriately triages patients with thyroid cancer to appropriate surgery.[1] Cytopathological reporting of thyroid FNAC has been a source of considerable confusion. A recent survey on the perception of diagnostic terminology and cytopathology reporting categories for thyroid FNAC demonstrated discordance between clinicians and pathologists. Historically, terminology for thyroid FNAC has varied significantly from one laboratory to another, creating confusion in some cases. To address terminology and other issues related to thyroid FNAC, THE NATIONAL CANCER INSTITUTE (NCI) proposed the six tiered " The Bethesda System for Reporting Thyroid Cytopathology" (TBSRTC). It helps to communicate thyroid fine needle aspiration interpretations to referring physicians in terms that are succinct, unambiguous and clinically helpful and it will be source of information for pathologists as well.[1]

This study will be conducted to report thyroid FNAC based on the Bethesda system. Fine needle aspiration has become the accepted way to initially evaluate thyroid lesions because it is relatively easy and safe to collect a specimen. Many of the problems associated with understanding thyroid FNAC reports could have been mitigated if consistent criteria and a standardized reporting system were used. Even though many diagnostic guidelines were proposed previously by multiple organizations such as Papanicolaou Society of Cytopathology, the American Association of Clinical Endocrinologists, The Royal College of Physician-British Thyroid Association etc, none were universally accepted.[2] There was a need to standardize reporting system that already existed in the form of The Bethesda System for Reporting Cervical Cytology. In 2007, a conference main objectives being to standardize the diagnostic terminology for the reporting of thyroid cytopathology results was held in Bethesda. The recommendations resulting from this conference led to the formation of The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC). It is a flexible framework and has standardized the diagnostic approach cytomorphological criteria and in reporting cytology of thyroid.

Each report begins with 6 general diagnostic categories with some categories having degree of subcategorization and two alternative names. Each of the categories has an implied cancer risk (ranging from 0% to 3% for the benign category to virtually 100% for the malignant category) that links it to a rational guideline for clinical management.[2]Estimation of accuracy of fine needle aspiration cytopathology (FNAC) of thyroid in diagnosis of different thyroid lesions, and evaluation of the value of reporting FNAC per guidelines of Bethesda system in reducing the number of un necessary thyroidectomies.

Thyroid swelling FNAC is an important procedure in the management of different thyroid conditions [3-7]. It can performed as an outpatient technique and is cost-effective, minimally invasive, extremely efficient in identifying benign thyroid nodules and thereby reducing unnecessary surgeries and to give a plan for ideal surgical approach [8,9]. Standard terminology is not implemented in cytopathology reporting of fine-needle aspiration (FNAC) thyroid [8,9].Institutional variation in giving different diagnostic terminology in reporting of thyroid cytopathology [10,11]. The nomenclature standardization is important for reporting thyroid cytopathology will enhance understanding and communication between pathologists and clinicians [12,13]. Various

methods have been used all over the world for reporting thyroid FNAC, ranging from two to six or more categories.

Two category systems include benign and malignant categories only. Other category systems are more complicated such as; inconclusive, equivocal, atypical, indeterminate, uncertain, suspicious of malignancy, possible malignant, and probable malignant [14]. Because of great difficulty in the interpretation of these reports, Clinicians could not plans for management [10-14]. The purpose of the present study is to standardize reporting of thyroid cytopathology in I patients 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/ Hürthle cell neoplasm/ suspicious of follicular neoplasm (FN/SFN), the suspicious of malignancy (SFM), and the malignant [15-18]. The second objective is to study the correlation of these thyroid lesions with different age groups and comparing our data with different studies of literature.

FNAC of the thyroid gland is now a well established first line diagnostic test for the workup of thyroid nodules with the main purpose of confirming benign lesions and thereby, reducing unnecessary surgery. Data suggest that FNAC has an overall accuracy rate around 95% in the detection of thyroid malignancy

MATERIALS AND METHODS

Patients

The current study was a retrospective study on 54 patients with thyroid swelling referred to the Department of Pathology, Karpaga Vinayaga Hospital in the period from January 2017 to Dec 2018.

The study was approved by Ethical Committee and a signed consent has been taken from all participant before starting of the study. Medical history, relevant clinical examination, and laboratory investigations were performed in accordance with recommendations issued by Bethesda System for Reporting of Thyroid Cytopathology (TBSRTC) system and National Cancer Institute (NCI) [11, 12]. Cases included in the present study were those with preoperative FNAC and The data of 54 cases with enlarged thyroid glands that were referred to our cytolaboratory in this period. Thyroid swellings were aspirated using disposable needles using standard procedures. The aspirated contents of needles were expelled onto the glass slides. Slides were immediately fixed in methanol and smears were stained with papanicolau and hematoxlin and eosin stains whereas slides were air dried before staining it with giemsa.

Technical details of ultrasoundguided FNAC from thyroid

Before aspiration from any patient a signed informed consent taken and the wright was given to patient to withdraw from study at any time. Patient should be asked about history of bleeding disorders or use of antithrombotic drugs such as warfarin to ovoid formation of local hematoma at the site of aspiration. The aspiration needles were disposable gauge-23 attached to 10ml disposable syringe. Aspiration must be performed and smeared by the cytopathologist and under ultrasound guideness. The site of aspiration should be cleaned with antiseptic. Aspiration usually performed without local anesthesia, but it might be needed for some patients whom can't tolerate pain, and those in those with deep seated thyroid nodules. Infiltration by 1 – 2 milliliters of lidocaine 1 – 2% over the nodule was enough for local anesthesia. Aspiration was performed using 4-5 passes at different sites of nodule under ultrasound guideness. After aspiration, the patient should stay in the clinic for ½ to 1 hour before leaving. The aspirated materials immediately expelled on labelled slides and smearedusing conventional methods. Most of smears immediately fixed in 95% methanol for atleast ½ hour and stained with Papanicolaou stain. One to 2 slides left to dry in air and stained by Giemsa stain to identify inflammatory cells especially lymphocytes and plasma cells in cases of thyroiditis.

Interpretation of smears

The diagnostic cytomorphologic criteria issued by Bethesda system for reporting thyroid cytopathology (TBSRTC) were followed for identifying the six categories of the TBSRTC [11, 12]. Each case must be examined by pathologists separately and reached to the same conclusion. Unsatisfactoryor non-diagnostic category (ND/UNS) was applied for all smears with insufficient or absent follicular epithelium, composed predominately of blood, thicksmear cases, and cases with extensive artifact of air-drying. Benign category was introduced for cases of colloid nodules, thyroiditis,and adenomatoid. Follicular lesion of undetermined significance or atypia of undetermined significance category (FLUS/AUS)was applied for cases in which the cytopathological features were not typical for benign category, and insufficient to be suspicious of follicular neoplasm or follicular/Hürthle cell neoplasms category. Cases with micro-follicles, scant to absent colloid, and with moderate to high cellularity were categorized as follicular neoplasm/suspicious of follicular neoplasm category (FN/SFN). Cases from this category with cells having oncocytic cytoplasm were identified as Hürthle cell neoplasm. Suspicious of malignancy category (SFM) includes all cases with low cellularity or degeneration of aspirated cells but with some features suggestive of anaplastic carcinoma, papillary carcinoma or lymphoma. Malignant category includes cases with adequate and well prepared smears allowing definitive cytopathologic diagnosis of carcinoma [11]. Occasional micropapillary thyroid carcinoma detected by cytopathology of multinodular goiters was not included in this category [16]. Details of reporting thyroid cytopathology and categories, expected risk malignancy, and the suggested management per TBSRTC [12], are seen in table -1.

Table 1: Reporting thyroid cytopathology according TBSRTC system.

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.)		Repeat FNA under ultrasound guidance
2. Benign; a. Adenomatoid nodule. b. Colloid nodule etc.) c. Lymphocytic (Hashimoto) thyroiditis. d. Granulomatous (subacute) thyroiditis. e. Others	0 – 3%	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 carcinoma b. Medullary carcinoma c. Poorly differentiated carcinoma d. Undifferentiated (anaplastic) carcinoma e. Carcinoma with mixed features (specify) f. Squamous cell carcinoma g. Non-Hodgkin lymphoma. h. Metastatic carcinoma. i. Others.	97 – 99%	Near total thyroidectomy

Statistics

The data was analysed and final results were listed according to frequency and gender. Data was expressed in percentages.

RESULTS

Out of 54 cases, Bethesda category I included 3 cases (5.5%), category II constituted 42 cases(77.7%) out of which 22 cases (52.38%) were benign follicular nodule type II, 13 cases(30.95%) were colloid nodule, 7 cases (16.7%) were hashimoto thyroiditis, category III (AUS) included 2 cases (3.70%), category IV (Follicular Neoplasm) had 4 cases(7.40%), category V (Suspicious of malignancy) included 2

cases (3.70%), category VI (malignant) constituted 1 case (1.85%). Male to female ratio was 1:6.9. Highest prevalence was noted in 30-40 years of age.

Table 2: Frequency of cases according to Betheseda system of classification

	TBSRTC CAT	Cases	Percentage
CAT I	ND/US	3	5.55%
CAT II	Benign	42	77.77%
CAT III	AUS/AFLUS	2	3.70%
CAT IV	FN/SFN	4	7.40%
CAT V	Suspicious Malignancy	2	3.70%
CAT VI	Malignant	1	1.85%
Total		54	

DISCUSSION

The aim for FNAC of thyroid is to separate benign from malignant conditions. Fine needle aspiration cytopathology from thyroid have markedly reduces the number of un necessary surgeries in most of the studies [3-5]. Most of these systems used in interpretation of thyroid cytopathology were not comprehensive, they are not including strict criteria of diagnosis of each category, and they are not including any suggestion for further management or risk of malignancy in each category. This resulted in increased of un necessary thyroidectomies and in inappropriate management. Bethesda system for reporting thyroid cytopathology (TBSRTC) implementing diagnostic criteria for cytopathological diagnosis of each and guidelines for management of each category.

Present study was conducted in Pathology department in our college. Total number of 54 cases of palpable lesions of thyroid were examined and analysed. Wherever necessary U.S.G. guided FNAC Thyroid FNAC is commonly performed outpatient procedure relied by most clinicians and has radically changed the management of patients with thyroid disease. In our study highest number of cases were in 30–40 years, whereas other study reported the median age to be 49 years. Male and female ratio was 1:6.9 in our study, however in other studies the ratio was 1:9 (gupta et al)[19], 1:5.2 (Sinna et al)[13], and 1:7.7 (Bagga et al)[20].

In the present study, the number of benign cases reported by TBSRTC system were 42 (77.77%), while malignant cases were 1 (1.85%), and remaining other categories were 20.38% collectively. 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.

Frequency of benign lesions in the present study findings are consistent with study of Nayar et al (64%)[21], Yang et al (64.6%)[22], Yassa et al (66%)[23], Jo et al (59%)[24], Mondal et al(87.5%)[10], Gupta et al (78%[19]. Thyroid malignancies accounted for 1.5% of allcases which is less in comparison to gupta et al[19] nayar et al[21] where it is 5%, whereas Sinna et a[13] showed19.5%, Yang et al[22] 7.5%, Jo et a[24] 7%, Mondal et al[10] (4.7%).

The great differences were in cases intermediate between benign and malignant condition and in their reporting by cytopathologist and management by clinicians. The difference in the methods of reporting system of thyroid cytopathology is confusing to pathologists as well as to clinicians, and making the clinical management as a personal decision thereby increasing the number of un necessary thyroidectomies. The Bethesda system is very useful for a standardized system of thyroid cytopathology reporting, best communication between clinicians and cytopathologists.

CONCLUSION

Fine needle aspiration cytopathology from thyroid nodule(s) is a safe, quick outpatient, cost effective and easy procedure if done by expert hands, but it needs a unified system of interpretation, reporting language and guidelines for proper categorization and management. TBSRTC provides uniform reporting system for thyroid fine needle aspiration and has high specificity.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. Thyroid Fna can play a pivotal role in the management of patients with thyroid nodules by Bethesda system directly confers risk of malignancy in each category which in turn prompts the recommended clinical management of that category thus establishing an excellent clinico-pathological corelation. providing clinicians with a clear and comprehensible cytopathology reports.

The Bethesda system is very useful for a standardized system of thyroid cytopathology reporting, best communication between clinicians and cytopathologists , leading to more consistent management approaches. The results of present study recommended the use of TBSRTC system in KIMS Hospital for reporting thyroid cytopathology in the future.

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