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Research Paper

Comparision Between Bethesda System and Conventional System in Thyroid Cytopathology

Medical Science

KEYWORDS : Bethesda & Conventional systems, Thyroid

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ABSTRACT

Fine needle aspiration cytology (FNAC) is widely used for the diagnosis of thyroid lesions. Bethesda system for reporting thyroid cytopathology (BSRTC) was introduced to streamline the reporting of thyroid aspirates. We aimed to evaluate the disease spectrum of thyroid cytopathology and correlation of BSRTC with the conventional cytopathology method and final histopathology. A Total of 110 patients who presented with thyroid swelling were evaluated by Bethesda and conventional cytopathology methods, histopathological examination and statistical analysis was done. The Bethesda method was found to be more superior. Sensitivity of Bethesda system was significantly high (95%) as compared to conventional system (75%). Specificity of Bethesda system was also significantly high (78.9%) as compared to conventional system (74.4%).

Introduction :

Fine needle aspiration cytology (FNAC) has been widely accepted as diagnostic procedure of choice in the evaluation of patients presenting with thyroid nodules[1].

The technique is a safe, minimally invasive, can be combined with imaging, easily performed with minimal patient discomfort, efficient, and an excellent cost effective method of evaluating thyroid lesions.

Its main purpose is to provide rational approach to management and to determine the correct surgical procedure when it is required.

A standardized categorical system for FNAC reporting makes the results easier to understand for clinicians and gives clear indications for therapeutic action.

Bethesda system for reporting thyroid cytopathology (BSRTC) emerged from a conference held at National Institute of Health in 2007 and lead to standardization of FNA reports. It alleviates inter-observer variability. BSRTC categorizes the FNAC diagnosis into six groups with well defined cancer risk and clear indications for further clinical management[2].

Aim and objectives :

(1) To compare the conventional and the Bethesda system for reporting thyroid (TBSRTC)
(2) To correlate the cases with histopathology.
(3) To determine the sensitivity, specificity, and predictive values of both the methods.
(4) To compare the data with that of other authors

Material and methods :

A study was conducted during 2009 to 2014 on 110 cases of thyroid swellings which were sent from departments of General Surgery and ENT for fine needle aspiration to the Department of Pathology, L.G. General Hospital, AMC MET medical College, Ahmedabad-8. Repeat aspiration was done in non-diagnostic or unsatisfactory cases so as to arrive at cytologic diagnosis and give proper guidance for management. The Bethesda system for reporting thyroid cytopathology was followed in comparison to the old conventional reporting system. Histopathology available in all cases was used as a gold standard to compare the sensitivity of both systems.

Conventional method :

As per conventional method of reporting, the cases were diagnosed and placed under the following categories[3].

1) Non diagnostic/ Unsatisfactory : smears were hemorrhagic or containing less than six groups of well-preserved follicular cells on each of at least two slides.
2) Colloid cyst : smears with follicular cells on thin or thick colloid background and hemosiderin laden macrophages.
3) Colloid goiter : follicular cells with abundant thick colloid background.
4) Follicular lesions/ Neoplasm : smears contained many follicular cells without or scanty colloid background or with predominant population of Hurthle cells, the differential diagnosis would include hyperplasic adenomatoid nodule with Hurthle cell change, Hurthle cell adenoma, and Hurthle cell carcinoma.
5) Indeterminate smears : containing cells with findings that were not clearly benign but were not diagnostic of a neoplasm or malignant lesions.
6) Suspicious for malignancy : smears suggested a follicular neoplasm, i.e. hyper cellular sample with scant colloid and a significant proportion of micro follicles, trabeculae, or crowded overlapping clusters of follicular cells (also includes lesions consisting of oncocytic (Hurthle cell) neoplasm.
7) Malignant lesions : Papillary Carcinoma, Medullary carcinoma, Anaplastic Carcinoma, Lymphoma, Metastatic carcinoma

THE BETHESDA SYSTEM OF REPORTING THYROID CYTOLOGY (TBSRTC) :

The same cases were re-re-evaluated and reported as per the Bethesda system of reporting having the following six categories[4].

For a thyroid FNA specimen to be satisfactory for evaluation (and benign), at least six groups of benign follicular cells were required, each composed of at least 10 cells.

1) Non diagnostic/ Unsatisfactory: cyst fluid only virtually acellular specimen other (obscuring blood, clotting artifact, etc).
2) Benign: Consistent with a benign follicular nodule (includes adenomatoid nodule, colloid nodule, etc)., Consistent with lymphocytic (Hashimoto) thyroiditis in the proper clinical context. Consistent with granulomatous (sub acute) thyroiditis and others.
3) Atypia of undetermined significance (AUS)/ Follicular lesion of undetermined significance (FLUS) :

An AUS result was obtained in 3% to 6% of thyroid FNAs[5,6].

4) Follicular neoplasm/ Suspicious for a follicular neoplasm:

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Specify if Hürthle cell (oncocytic) type.

5) Suspicious for malignancy: Suspicious for papillary carcinoma or medullar carcinoma, or metastatic carcinoma, or lymphoma.
6) Malignant : Papillary thyroid carcinoma, Poorly differentiated carcinoma, Medullary thyroid carcinoma, Undifferentiated (anaplastic) carcinoma, Carcinoma with mixed features (specify), Non-Hodgkin lymphoma, and others.

Histopathological diagnosis was used as the gold standard for correlation with the cytological interpretations.

Results & Observations :

The distribution of 110 cases as per conventional reporting method with their histopathologic diagnosis (HP) is mentioned in Table – 1. The distribution of same cases as per Bethesda system of reporting with HP is presented in Table - 2

Table -1
Distribution of cases as per conventional method of reporting

Category	Cytopathology		Histopathology		
	Diagnosis	No.	Benign	Malignant	No.
2	Colloid goiter	51	47	4	51
3	Colloid cyst	16	15	1	16
4	Thyroiditis	5	5	0	5
5	Follicular lesions/ Neoplasms	18	17	1	18
6	Indeterminate	6	4	2	6
7	Suspicious for malignancy	5	2	3	5
8	Malignant lesion	9	0	9	9
	TOTAL	110	90	20	110

Table – 2
Distribution of cases as per The Bethesda system of reporting

Diagnostic Category (DC)	Cytopathology		Histopathology		
	Diagnosis	No.	Benign	Malignant	Total No.
2	Benign	72	71	1	72
3	Atypia of undetermined significance (AUS) or follicular lesion of undetermined significance (FLUS)	8	7	1	8
4	Follicular lesions/ suspicious for it FN/ SFN	16	10	3	13
5	Suspicious of malignancy	5	2	3	5
6	Malignant	9	0	12	12
	TOTAL	110	90	20	110

With Bethesda system, DC 6 (malignant diagnostic category) was assigned to 8.2 % of FNAs, DC 5 to 4.5 %, DC 4 to 14.5 % DC 3 to 7.3 and DC 2 to 65.5 % FNAs.

Comparative Statistical analysis of both methods is as follows :

Statistical analysis : The sensitivity, specificity and predictive values were calculated considering thyroid FNA as a 'screening test' and Histopathology as gold standard. FNA benign were considered to be true negative samples and the remaining categories were considered to be positive samples because they led to a recommendation of surgery.

Table – 3
Comparision of statistical analysis of Conventional and Bethesda system of reporting

Criteria	Conventional method	Bethesda system
Sensitivity	75 %	95 %
Specificity	74.4 %	78.9 %
Positive predictive value	39.5 %	50 %
Positive predictive value	93.1 %	98.6

Conventional method
- Sensitivity – 75 %
- Specificity – 74.4 %
- Positive predictive value – 39.5 %
- Negative predictive value – 93.1 %

Bethesda system of reporting
- Sensitivity – 95 %
- Specificity – 78.9 %
- Positive predictive value – 50 %
- Negative predictive value -98.6 %

Above data shows high sensitivity and high negative predictive values with Bethesda system as compared to conventional method.

Discussion :

Thyroid nodules are a common clinical problem and FNAC of the thyroid is often the key preoperative test usually preceded by imaging examination. An assessment regarding the need to exclude malignancy using FNA must be performed . FNAC helps to determine whether surgical removal of a detected nodule is recommended or not. The data shows that, introduction of the new simplified Bethesda thyroid reporting system into six categories logically relates to the prognosis of thyroid diseases and increases the reproducibility of diagnosis[7].

Each diagnostic category conveys specific risks of malignancy, which offers guidance for patient management[8].

With Bethesda system, in present study DC 6 (malignant diagnostic category) was assigned to 8.2 % of FNAs, DC 5 to 4.5 %, DC 4 to 14.5 %, DC 3 to 7.3 and DC 2 to 65.5 % FNAs. This data correlates with data of Bongiovanni et al[9] who in a meta-analysis of 25445 FNAC cases assigned 5.4 % to DC 6, 2.6 % to DC 5, 10.1 % to DC 4, 9.6 % to DC 3 and 59 % to DC 2 category to FNAs.

The sensitivity and negative predictive values of our study with Bethesda system proved to be 95 % and 98.6 % respectively. Comparative analysis with other studies is shown in Table -3. When compared with similar studies we found that our findings were consistent with other studies like Gharib et al.[10] and Yassa L et al.[5] which was conducted on 731 and 268 cases respectively. Himakhm et at[11] reported 82 % sensitivity and 100 % specificity in their study of 469 cases. Gupta et al[12] reported 80 % sensitivity and 86.6 % specificity in 75 cases. M. Mamatha et al[13] in study of 240 cases reported 100 % sensitivity and and 82.5 % specificity.

Table -4
Comparison of sensitivity and specificity with other studies

Study	No. of cases	Sensitivity	Specificity
Gharib, et al. [10]	731	99.3%	81.4%
Yassa, et al. [5]	268	98.6%	80%
Himakhm et at [11]	469	82 %	100 %
Gupta et al [12]	75	80 %	86.6 %
M. Mamatha et al [13]	240	100 %	82.5 %
Present study	110	95 %	91.1 %

Conclusion :

The Bethesda system of reporting gives high sensitivity and high negative predictive values. With FNAC as initial management, inter observer variability is reduced by Use of Bethesda reporting system helps in the prognosis, management and minimizes the unnecessary surgical procedures for thyroid swellings.

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