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Diagnostic Utility of Bethesda System for Reporting Thyroid Cytopathology

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Abstract

Introduction: Fine needle aspiration cytology (FNAC) plays a vital role in the management of thyroid lesions. Historically terminologies used for reporting thyroid FNAC has varied significantly from one laboratory to another, creating confusion in some cases. A uniform reporting system for thyroid FNAC will facilitate effective communication among cytopathologists, endocrinologists, surgeons, radiologists and other health care providers. Present study is done to evaluate the efficacy of The Bethesda system for reporting thyroid cytopathology. *Methodology*: Patients with thyroid lesions referred to the Pathology Department, Medical College, Hospital & Research Centrefor FNAC are taken. Interpretation of these cases was done as Per the Bethesda System. *Results:* Total number of cases studied on FNAC were 104. Out of 104 cases 82(78.8%) were benign lesions, 10(9.6%) were unsatisfactory/ nondiagnostic, 6(6.20%) were Follicular Neoplasm/ suspicious for neoplasm, 4(4.16%) were suspicious of malignancy, 3(3.12%) were Malignant and 1case was reported as Atypia of undetermined significance. *Conclusion*: Bethesda system of reporting thyroid cytopathology is beneficial for clinical follow up and surgical management. It helps to reduce the rate of unnecessary thyroid surgery for benign thyroid lesion and helps to plan the surgical management in malignant thyroid lesion.

Keywords: Thyroid; Fine Needle Aspiration Cytology; The Bethesda System.

Introduction

Thyroid lesions are common among the general population and often represent a large proportion of endocrine referral. The diagnosis of thyroid lesions is of great importance because most are amenable to medical or surgical management. Clinical assessment of thyroid lesions by means of physical examination, thyroid scans and ultrasonography is not completely reliable [1].

Fine needle aspiration cytology (FNAC) is the cost-effective, safe and play an essential role in the in the pre-operative evaluation of thyroid lesions. An adequate thyroid aspirate is necessary for the interpretation of FNAC. The estimation of sensitivity and specificity of FNAC depends on how follicular proliferation is examined [2]. The diagnostic dilemma of the cytopathologist will be in the lesions of thyroid which are diagnosed as atypical or suspicious of malignancy in 15-30% cases. Though histopathological diagnosis is the gold standard, the fine needle aspiration diagnosis plays a vital role in the proper management of the patient [3].

Historically, terminology for thyroid FNAC has varied significantly from one laboratory to another, creating confusion in some cases. A uniform reporting system for thyroid FNAC will facilitate effective communication among cytopathologists, endocrinologists, surgeons, radiologists and other health care providers.

The interpretation should provide relevant information that will assist referring physicians, in the management of patients. It should also facilitate cyto-histologic correlation of thyroid diseases and allow easy and reliable sharing of data from different laboratories for national and international collaborative studies.

The terms for reporting results should also have an implied risk of malignancy on which recommendations for patient's management is decided [4].

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The present study was done to interpret the Thyroid FNAC as per the Bethesda system and to evaluate the efficacy of the Bethesda system for reporting thyroid cytopathology by taking histologic findings as standard.

Methodology

Detailed clinical history and examination findings of the patients were noted Standard FNAC procedure was performed by using Cameco syringe pistol, disposable syringe {10ml} and 24-20G needle. Multiple smears were prepared simultaneously. Wet-fixed smears in absolute alcohol were stained with Hematoxylin and Eosin {H&E} and Papanicoloau stains while air dried smears were stained with May-Grunewald Giemsa {MGG} stain.

The FNA was done with a 22-23 gauge needle disposable needle attached to a 20ml plastic disposable syringe mounted on a handle (syringe holder) for single –hand grip. The patient was made to lie down in supine position with neck hyper-extended. Extension of the neck was facilllited by avoiding a pillow under the head, and keeping under the neck to further extend the cervical spine and expose the gland more prominently. The patient was asked to refrain from swallowing during the procedure which takes about 5-20 sec.

The skin overlying the swelling was cleaned thoroughly with alcohol. The needle is inserted into the nodule and plunger is retracted to create a vacuum in the syringe. The needle is then removed back and forth and from side to side gently within the lesion, all the time maintaining the negative pressure in the syringe. The plunger was then released. The needle with syringe was then withdrawn from the thyroid. The needle was quickly detached from the syringe and the plunger was retracted to allow air to fill the syringe barrel. The needle was then re-attached to the syringe and the contents ejected on to a glass slide by pushing down the plunger. Thyroid specimens received were fixed in 10% formalin for 12 to 24 hrs after recording the gross morphological features. The specimens were routinely processed, embedded in paraffin wax and sections were cut at 3 to 6 μm thickness. Sections were stained routinely with H&E stain. Special stains like Congo red were employed wherever indicated.

Morphological criteria such as cellularity (mild, moderate, marked and scanty) Arrangement such as (clusters, follicles, trabecular, papillary and singly scattered) cytoplasmic, nuclear details and background colloid material were utilized for categorization of thyroid lesion.

Results

Total number of cases studied on FNAC were 106. Out of 106 cases 82 (77.3%) were benign lesions, 10 (9.4%) were Unsatisfactory/ Nondignostic, 6 (5.7%) were Follicular neoplasm/Suspicious for neoplasm, 4 (3.8%) were suspicious of malignancy, 3 (2.8%) were Malignant and 1 (0.9%) case was reported as Atypia of undetermined significance.

Table 1: Cytological Diagnosis as per the Bethesda system

Cytological Diagnosis	No of Cases	Percentage
Unsatisfactory	10	9.4%
Benign follicular lesion	82	77.35%
Atypia of follicular lesion of undermined significance	1	0.9%
Follicular neoplasm /Suspicious for follicular neoplasm	6	5.6%
Suspicious for malignancy	4	3.77%
Malignant tumour	3	2.83%
Total	106	100

Maximum number of cases reported on cytology were benign thyroid lesion amounting to 14.4%

Table 2: Thyroid lesion for which surgical resection done

Diagnosis on Cytology as per Bethesda system	Total no cases	Total no Histopathological follow up available	Percentage of follow up cases available	Diagnosis on Histopathology
Unsatisactory	10	5	50	Nodular Goiter with cystic change
Benign	82	44	48	MNG
Atypia of follicular lesion of undetermined significance	1	1	100	MNG with adenomatoid hyperplasia
Follicular neoplasm/suspicious of neoplasm	6	2	33.3	Follicular carcinoma
Suspicious of malignancy	4	2	50	Follicular carcinoma
Malignant	3	2	75	Malignant

Out of 10 cases reported as unsatisfactory on FNAC, 5 (50%) cases had histopathological Follow up which were diagnosed as nodular goitre with cystic change on histopathology.

Out of 82 cases reported as Benign Follicular lesion on cytology, 44(48%) cases had histopathological follow up and all were diagnosed as Multinodular Goitre.

One case was reported as Atypia of follicular lesion of undetermined significance on cytology which on histopathology was reported as MNG with adenomatoid hyperplasia.

Out of 6 cases reported as Follicular Neoplasm/ Suspicious of follicular neoplasm on Cytology, 2 (33.3%) had histopathological follow up and reported as Follicular carcinoma, because both the cases showed Features of Follicular carcinoma having capsular invasion .

Four Cases reported as Suspicious of malignancy on FNAC because of the repitative pattern of microfolicles and had cyto architectural dislodgment. Follicular cells were larger in size. Out of 4 cases 2 cases had histopathological follow up and proved to be follicular carcinoma

Out of three Cases which were reported as Malignant on cytology 2 (75%) had histopathological follow up and reported as malignant and one case reported as poorly differentiated malignancy and sent for radiotherapy.

One case had metastasis over gluteal region .Histopathology of both thyroid and gluteal region showed features of carcinoma.

Out of 56 cases where cytological and histopathology correlation was available, 8 cases showed cyto-histologic discrepancies amounting to 14.4%

In the present study percentage of benign thyroid lesion was more as compared to the study done by other authors.

In 8 cases discrepancy was noted. Out of 8 cases 5 cases were reported as unsatisfactory on cytology which were reported on histopathology as MNG in 3 cases and MNG with cystic change in 2 cases. One case of AFLUS was reported as MNG with adenomatoid hyperplasia and 2 cases which were reported as suspicious for malignancy on cytology were diagnosed as follicular carcinoma on histopathology.

Table 3: Comparision of cytological and histopathological diagnosis of 56 cases

Bethesda System Categories	Total no of cases on cytology	Histopathology	Analysis of discrepancy
Unsatisfactory	5	0	Present
Benign-MNG	44	50	Absent
Atypia of undetermined significance	1	0	Present
Follicular Neoplasm/Suspicious of Neoplasm	2	2	Absent
Suspicious of malignancy	2	0	Present
Malignant	2	4	Absent

Table 4: Comparison of percentage of distribution of fine needle Aspiration Diagnoses among published studies

Diagnostic category	Present study	Yassa et al	Yang et al	Nayar and Ivanovic
Nondiagnostic/Unsatisfactory	10	7	10.4	5
Benign	82	66	64.6	64
Atypia of follicular lesion of Undetermined significance	1	4	3.2	18
'Suspicious for Follicular Neoplasm'	6	9	11.6	6
Suspicious for malignancy	4	5	2.6	2
Malignant	3	5	7.6	5

Table 5: Analysis of discrepancy

Diagnosis by FNA cytology by (Bethesda system)	Diagnosis by Histopathology (standard system)
Unsatisfactory(cyst fluid only)	MNG with cystic change
Unsatisfactory(cyst fluid only)	MNG
Unsatisfactory(cyst fluid only)	MNG with cystic change
Unsatisfactory(cyst fluid only)	MNG
Unsatisfactory(cyst fluid only)	MNG
Atypia of follicular neoplasm of undetermined significance	MNG with adenomatoid hyperplasia
Suspicious of malignancy	Follicular carcinoma

Discussion

Diagnostic categories of thyroid lesions are defined differently in different institution. To bring uniformity new 6 categories are recommended by Bethesda system.

In this study an attempt was made to report the thyroid FNA as per the Bethesda system and also to assess the efficacy by comparing with the histopathological diagnosis wherever possible.

Out of 106 samples in this study 9.4% were Unsatisfactory, 77.35% were benign follicular lesion, 0.9% were AFLUS, 5.6% were FN/SFN, 3.7% were suspicious for malignancy and 2.8% were Malignant. Similar findings were noted in study done by Yassa et al[5] in which unsatisfactory were 7%, Benign follicular lesion were 66%, AFLUS were 4%, FN/SN were 9% and 5% cases of suspicious of malignancy and Malignant each.

Maximum number of cases in the present study were in the age group of 21- 50 years. Our findings are similar to the study done by Siddique M et al [4].

Percentage of females in present study was 90%, which was similar to study done by Siddique M et al [6].

In the present study surgical follow up was available in 53% cases in which cyto-histological discrepancy was noted in 14.4%

In the study done by yang et al [7] out of 4713 FNA cases, 1052 patients had surgical follow up. The cytohistological discrepancy in their study was 15.3%. Cytohistological discrepancy in our study was similar to the study done by yang et al [7].

Rate of malignancy in benign thyroid lesion in study done by Jo V Y et al [8] was 1.1%.However in the present study out of 82 cases of benign thyroid lesion, 44 cases had histopathological follow up and all cases were reported as benign thyroid lesion. Thus the rate of malignancy in the present study was 0%.

If FNA yields low cellularity with small number of abnormal cells then the lesion will be interpreted as suspicious of malignancy. In a study done by Jo VY et al [8] 2.3% cases were reported as SM. In the present study 7.14% of cases were reported as SM. Rate of malignancy in the study done by Jo VY et al [8] was 70%. In the present study 4 cases were reported as suspicious of malignancy. Out of which 2 cases had surgical follow up and reported as malignant amounting to 100% risk of malignancy in categories reported as SM.

Rate of FN/SFN was 23.4% in the study done by Jo VY et al [8]. In the present study 6 cases were reported as FN/SFN, out of which 2 cases had surgical follow up and were reported as Follicular carcinoma amounting to 33.3% risk of malignancy in categories reported as FN/SFN [1].

Diagnostic category of AFLUS is heterogenous in various studies. Diagnostic frequency of AFLUS in study done by Jo VY et al [8] was 3.4% and was 18% in study done by Nayar and Ivanovic [9]. In the present study only one case amounting to 0.9% was reported as AFLUS which was reported as benign lesion on histopathology.

In a study done by Nayar and Ivanovic [9] 6% cases of AFLUS turned out to be malignant. Malignant rate in AFLUS in study done by Jo VY et al [8] was 17% and they concluded that AFLUS has an important role in triaging patients with AFLUS. In the present study sample size was small and was the limitation and underscores the interpretation of AFLUS.

FNAC is a sensitive and highly specific method of evaluating thyroid nodules for malignancy. FNAC of the thyroid nodule is reported to have sensitivity ranges from 65% -98% and a specificity of 72%-100% [10].

In the study done by Nggada [11] the sensitivity was 88.9% and specificity was 96%.In the present study sensitivity was 60% and specificity was 98% which is similar to the study done by Nggada [11].

In the study done by Saddique M et al [10] the Positive predictive value was 81.8% and Negative predictive value was 93.81%.In the present study the Positive predictive value was 75% and Negative predictive value was 96% which is similar to that of Saddique M et al [10].

Conclusion

Universal application of new standardized nomenclature of Bethesda system improves interlaboratory agreement and helps in consistent management of thyroid lesions.

Guides the management of nodules by identifying patients who require surgical resection and patients who require no further interventions.

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