

BETHESDA SYSTEM FOR REPORTING THYROID CYTOPATHOLOGY- A STUDY AT RURAL TERTIARY CARE CENTRE

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ABSTRACT

BACKGROUND

Thyroid lesions are very common in coastal regions of Andhra Pradesh and can be accurately diagnosed on cytology. Due to lack of standardised system of reporting thyroid aspirates, there is lot of confusion between the terminologies used by the pathologist and clinicians, hence a need for reporting system which can narrow the gap.

The aim of the study is to study the distribution of various thyroid lesions on cytology adopting The Bethesda System for reporting Thyroid Cytopathology in a rural hospital.

MATERIALS AND METHODS

It is an observational study for a period of 2 years from January 2015 to December 2016. 218 cases of thyroid lesions were aspirated during this period both by aspiration and non-aspiration techniques. The cytology smears were reported by adopting Bethesda reporting system dividing into 6 diagnostic criteria.

RESULTS

Male: Female ratio was 1:6.5. Thyroid lesions were common in the age group of 21-40 years (46.33%). In category II, nodular and colloid goitres were common (62.38%). Lesions in the category III (atypia of undetermined significance or follicular lesions of undetermined significance) constituted 6.42% of lesions and follicular adenoma (Category IV) was 4.58%. Lesions in the category V (suspicious of malignancy) was 3.21% and category VI (Malignant lesions) constituted 2.75% of lesions.

CONCLUSION

The overlap features of follicular lesions with atypical features could be easily categorised by adopting Bethesda system into categories like follicular lesions of undetermined significance and suspicious of malignancy, which guides the clinician for appropriate management.

KEYWORDS

Bethesda Reporting System, Thyroid Lesions, Distribution of Lesions, Rural Hospital.

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BACKGROUND

Thyroid lesions are very common in coastal regions of Andhra Pradesh with overlap of features on cytology. Reporting of thyroid aspirates by adopting Bethesda Diagnostic criteria can narrow the gap between clinicians and pathologists enabling better diagnostic management and unnecessary surgical intervention. Due to lack of standardised system of reporting thyroid aspirates there is lot of confusion between the terminologies used by the pathologist hence making the clinicians difficult to interpret, indirectly effecting management.^{1,2} It is documented in literature that by adopting this system the inter observer

variability is narrowed. In the present study an effort was made to report thyroid aspirates by adopting 6 tier Bethesda diagnostic criteria and results were tabulated.

MATERIALS AND METHODS

This a prospective observational study conducted in the department of pathology at tertiary care centre of rural area for a period of two years from January 2015 to December 2016. During this period 218 cases with thyroid enlargement were subjected for Fine Needle Aspiration Cytology using both aspiration and non-aspiration technique. The wet smears were fixed in 95% isopropyl alcohol and stained with haematoxylin and eosin. Air dried smears were stained with Leishman's stain. The smears were interpreted using Bethesda Diagnostic criteria adopted by Cibán and Ali.³

The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC):

Recommended diagnostic categories adopted by Ali and Cibán.³

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No.	Name of the Category
I	Nondiagnostic or unsatisfactory Cystic fluid only Virtually acellular specimen Other (obscuring blood, collecting artefacts, etc.)
II	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 (subacute) thyroiditis Other
III	Atypia of undetermined significance or follicular lesion of undetermined significance
IV	Follicular neoplasm or suspicious for a follicular neoplasm Specify if Hurthle cell (oncocytic type)
V	Suspicious for malignancy Suspicious for papillary carcinoma Suspicious for medullary carcinoma. Suspicious for metastatic carcinoma Suspicious for lymphoma Other
VI	Malignant Papillary thyroid carcinoma Poorly differentiated carcinoma Medullary thyroid carcinoma. Undifferentiated (anaplastic) carcinoma, Squamous cell carcinoma, Carcinoma with mixed features (specify) Metastatic carcinoma Non-Hodgkin's lymphoma

The Lesions were Broadly Divided in to 6 Groups.

- Category I: Non-diagnostic or unsatisfactory
- Category II: Benign lesions
- Category III: Atypia of undetermined significance or follicular lesions of undetermined significance
- Category IV: Follicular neoplasm or suspicious for a follicular neoplasm
- Category V: Suspicious for malignancy
- Category VI: Malignant.

The various cytological patterns were recorded and analysed.

RESULTS

218 cases of thyroid lesions were aspirated during this 2 year period. Thyroid lesions were common in the age group of 21-40 years (n=101, 46.33%) followed by 41-60 years (n=71, 32.56%). In the category I all the cases were diagnosed as colloid cysts.

In category II, nodular goiters commonly occurred in the age group of 21-60 years (n=68, 31.19%). Chronic lymphocytic thyroiditis most commonly occurred between 21-40 years (n=17, 7.79%). And Hashimoto's thyroiditis occurred between 21-60 years (n=10, 4.58%). Two cases of follicular neoplasm occurred in the age group of less than 20 years. Follicular neoplasms were more common in the age group of 41-60 years (n=5, 2.29%). Lesions in the category III (atypia of undetermined significance or follicular lesions of undetermined significance) ranged from 21-65 years (n=14, 6.42%). Lesions in the category V (suspicious of malignancy) were seen between 21-40 years and 61-80 years (n=7, 3.2%). Malignant lesions were common in the age group of 21-60 years (n=6, 2.75%). [Table 1] Male: Female ratio was 1:6.5 [Table 2]. Colloid

cysts constituted 9.63% of cases, nodular goiter and colloid goitre constituted 62.38% of cases, 11% were chronic lymphocytic thyroiditis, follicular lesions of undetermined significance were 6.42% (Fig. 1), follicular adenomas were 4.58% of lesions, suspicious of malignancy was 3.21% (Fig. 2) and papillary carcinoma of thyroid was 2.75% of cases (Table 3) (Fig. 3).

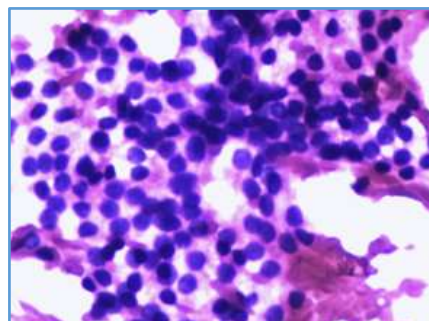


Figure 1

Figure 1. Atypia of Undetermined Significance or Follicular Lesion of Undetermined significance (Category III): Cellular smears with thyroid follicular cells arranged in follicles, nuclear crowding and anisonucleosis in background of colloid (H & E, 400X).

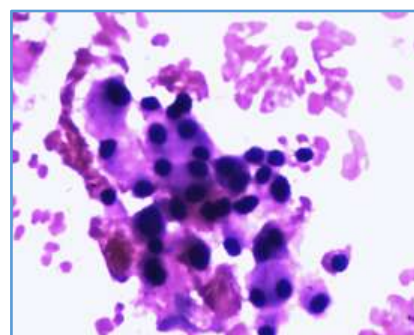


Figure 2

Figure 2. Suspicious of malignancy (Category V): Smears studied show sheet of loosely arranged thyroid follicular cells with anisonucleosis some with plasmacytoid appearance (H&E, 400X)

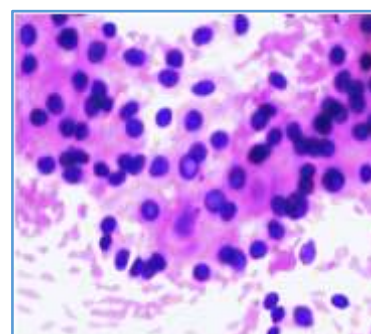


Figure 3

Figure 3. Malignancy (Category VI): Smears studied show thyroid follicular cells arranged in repetitive follicles with nuclear overcrowding and intranuclear cytoplasmic inclusions (H & E, 400X).

Bethesda Diagnostic Categories	Total No. of Lesions	1-20 yrs.	21-40 yrs.	41-60 yrs.	61-80 yrs.
I	21	2	8	7	4
II	160	20	78	52	10
III	14	-	6	5	3
IV	10	2	3	5	-
V	7	-	2	-	5
VI	6	-	4	2	-
Total	218	24	101	71	22

Table 1. Age Distribution of Thyroid Lesion as per Bethesda Diagnostic Categories -218

Bethesda Diagnostic Category	Total No. of Lesions	Female	Male
I	21	19	2
II	160	142	18
III	14	9	5
IV	10	8	2
V	7	6	1
VI	6	5	1
Total	218	189	29

Table 2. Sex Distribution in Thyroid Lesions as per Bethesda Diagnostic Category -218

Bethesda Diagnostic Category	No. of Lesions	%
I. Colloid Cyst	21	9.63
II. Consistent with a benign follicular nodule	136	62.38
Consistent with Lymphocytic/ (Hashimoto's) thyroiditis	24	11.00
III. Atypia of undetermined significance or follicular lesions of undetermined significance	14	6.42
IV. Follicular neoplasm or suspicious of Follicular neoplasm	10	4.58
V. Suspicious for malignancy	7	3.21
VI. Malignancy	6	2.75

Table 3. Cytological Patterns as per Bethesda Diagnostic Category -218

DISCUSSION

Category I

Lesions as per Bethesda system- Adequacy of thyroid aspirations was inclusion of at least six groups of follicular cells, each group consisting of at least ten follicular cells.^{4,5} Aspirations which show only colloid and cyst macrophages are included in this category. In the study by Santhosh Kumar Mondal et al,⁶ this category which showed only colloid with cyst macrophages were included in non-diagnostic category which was 1.2%. Jo VY, Stelow et al,⁷ Yassa et al,⁸ Yang et al,⁹ and Nayar and Ivanovic et al,¹⁰ documented non-diagnostic aspirates of 18.6%, 7%, 10.4% and 5% respectively. In the study by I.V. Renuka et al,¹¹ non-diagnostic aspirates were 17%. In the present study non-diagnostic aspirates were given the diagnosis of colloid cysts and constituted 9.63% of cases which correlated with study by Yang et al.⁹

Category II

Lesions as per Bethesda System

The term benign follicular nodule applies, adequately cellular smears with varying proportions of colloid and benign follicular epithelial cells showing both hyperplastic and involuting follicles. If there is predominant micro follicular pattern in the back ground of abundant colloid it is still considered as benign follicular nodule. Other benign categories include features consistent with chronic lymphocytic thyroiditis or Hashimoto's thyroiditis or chronic granulomatous thyroiditis. The diagnosis depends on the proportion of reactive population of lymphocytes epithelioid cells, foreign body, Langhans giant cells and Hurthle cells. In the study by Santosh Kumar et al benign lesions constitute 87.5% of the lesions.⁶

Jo VY et al⁷ documented 59%, Yassa et al,⁸ documented 66%, Yang et al⁹ 64.6% and Nayar and Ivanovic¹⁰ 64%. In

the study by I. V. Renuka et al¹¹ they documented 70.56% of benign lesions with less preponderance in males, common age group being 20-30 years. In the present study the benign lesions were more common in the age group between 21-60 years. Nodular goiter and colloid goiter constituted 62.38% of lesions and chronic lymphocytic thyroiditis constituted 11% of lesions. Present study correlated with Yang et al⁹ and Nayar and Ivanovic et al.¹⁰

Category III

There is prominent micro follicular pattern which does not fulfil the criteria of follicular neoplasm or malignancy, predominance of Hurthle cells, paucity of follicular cells and scant colloid, drying artefacts with enlargement of nuclei and intracytoplasmic inclusions, Hurthle cell nodule in nodular goiter, atypical lymphoid cells in lymphocytic thyroiditis, cystic aspirations with follicular cells having intra nuclear cytoplasmic inclusions where definitive diagnosis is not possible are seen in this category. In the present study this group constituted 6.4% of cases which correlated with study by Yassa et al.⁸ Other studies by I. V. Renuka et al¹¹ showed 1.95%, Santhosh Kumar et al⁶ showed 1%, Jo et al⁷ 3.4%, Yang et al⁹ showed 3.2% and Nayar and Ivanovic et al¹⁰ showed 18%.

Category IV

Solitary thyroid nodule with hyperplastic proliferations of follicular cells cannot be distinguished with follicular adenoma. Capsular and vascular invasion in follicular carcinoma cannot be assessed on cytology alone. This represents a broad set of lesions which has to be interpreted with great caution. Lesions with repetitive follicular pattern, nuclear crowding, absence of nuclear grooves and intra nuclear cytoplasmic inclusions with scant colloid usually lead you to the diagnosis of follicular adenoma but the exception

to this rule is macro follicular adenoma. Oncocyte cells with features of papillary carcinoma are ruled out from this subset. In the present study follicular neoplasms constituted 4.58% of the total lesions. This correlated with study by Santosh et al⁶ being 4.2% and I. V. Renuka et al¹¹ being 4.2%. Other studies documented were 6% by Nayar and Ivanovic et al¹⁰ 9.7% by Jo et al⁷ 9% by Yassa et al⁸ and 11.6% by Yang et al.⁹

Category V

This category includes long standing goiters with foci of micro papillary carcinoma, papillary hyperplasia, Hurthle cell nodule with intra cytoplasmic inclusions, follicular variant of papillary carcinoma and papillary variant of follicular adenoma where there is increased cellularity, nuclear crowding with intra nuclear cytoplasmic inclusions in some of the nuclei. In the back ground there is variable amount of thick and thin colloid. In the present study this group comprised of 3.21% of the total lesions. Which correlated with the study by Yang et al⁹ and I. V. Renuka et al¹¹ being 2.6% , Santosh Kumar et al⁶ Jo et al⁷ Yassa et al⁸ and Nayar and Ivanovic et al¹⁰ showed 1.4%, 2.3%, 9% and 2% respectively.

Category VI

In this category the cytomorphological features are definitive and can be sub classified easily basing on the cytological features. In the present study papillary carcinoma constituted 2.75% of the total lesions. Santosh Kumar et al,⁶ Jo et al,⁷ Yassa et al,⁸ Yang et al⁹ and Nayar and Ivanovic et al¹⁰ documented 4.7%, 7% , 5%, 7.6% and 5% of cases respectively. In the present study the percentage of malignant lesions was less when compared with other studies.

In I. V. Renuka et al¹¹ and other studies provided follow up and management strategies for the Bethesda categories which are as follows-

- Category I. They advised repeat aspiration by ultrasonography.
- Category II. Recommended management was clinical follow up of the cases.
- Category III. Risk of cancer is 5-15% hence recommended management protocol was repeat FNAC after sufficient time gap.
- Category IV. Recommends lobectomy for this category.
- Category V. Recommends near total thyroidectomy or lobectomy.
- Category VI. Recommends near total thyroidectomy and assessment of metastasis.

CONCLUSION

In present study, reporting cytology smears based on six tier Bethesda system could provide an insight into management strategies. Benign group constituted 73.38% of the lesions, follicular lesions of undetermined significance (6.42%),

suspicious of malignancy (3.21%), and malignancy (2.7%). Interpretation of the subset follicular lesions of undetermined significance and suspicious of malignancy had clear cut criteria in the Bethesda format of reporting, which helps in guiding the clinician for appropriate management, indicating cancer risk and also reduces inter observer variability.

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