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CYTOLOGIC STUDY OF THYROID NODULE WITH BETHESDA SYSTEM & HISTOLOGIC FOLLOW UP

Pathology

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ABSTRACT

Among Asian women, thyroid swelling is common problem. Fine needle aspiration cytology (FNAC) is widely used to categorize the thyroid swelling between benign and malignant condition. To streamline the reporting of thyroid aspirate Bethesda system was introduced. In this study, we evaluated this disease, spectrum of thyroid cytopathology and correlated with histopathology. The study was conducted in pathology department of tertiary health care. FNAC of thyroid swelling was done in 160 patients. Out of these 48 patients subsequently underwent surgical excision. Cytological diagnosis was correlated with final histopathological result.

KEYWORDS

Thyroid swelling, Fine needle aspiration cytology, Bethesda system, histopathological correlation.

Introduction-

Thyroid FNA is among the commonly performed cytological procedure[1-3] and a first line diagnostic test for evaluating a thyroid nodule[4].

Although benign nodules outnumber malignant lesions, the risk of malignancy needs to be evaluated pre-operatively to determine the type of surgery to be performed. Fine needle cytology was introduced for the same reason and it soon gained wide acceptance among clinicians as it is cost effective and has good patient compliance[4-7]. Also FNA evaluation of thyroid nodules reduces load of unnecessary surgeries for benign lesion[8] and guides for timely surgical intervention when there is significant risk of malignancy[9-13].

However in the past there was various different terminologies of reporting thyroid FNAC[14,15], which varied from two category schemes to six or more category schemes[16], that had made it difficult for clinicians to interpret the reports[17,18].

To overcome this issue, in the year 2007, the National Cancer Institute Bethesda Maryland, United states organized the NCI Thyroid Fine Needle Aspiration State-of-the-science conference and proposed a system known as the Bethesda system for reporting thyroid cytopathology (BSRTC)[19]. The atlas illustrates six diagnostic categories of lesions: Non-diagnostic/unsatisfactory, benign, atypical follicular lesion of undetermined significance (AFLUS), suspicious for follicular neoplasm(SFN), Suspicious for malignancy(SM) and malignancy[20]. BSRTC not only categorizes the thyroid lesions but also explains well defined risk of malignancy and clear indication for clinical management[21,22]. This prospective study aims at correlating BSRTC with final histopathology in patients who underwent surgical procedure.

Table-1: Bethesda system for reporting thyroid cytopathology-Recommended Diagnostic Categories[21,22]

I. Nondiagnostic or Unsatisfactory
Cyst fluid only
Virtually acellular specimen
Other (obscuring blood, clotting artifact, 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 Hürthle 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 lymphoma
Other

Table 1- Each of these categories have implied risks of malignancies with a recommended clinical management[21,22].

Diagnostic category	Risk of Malignancy (%)	Usual Management
Nondiagnostic or Unsatisfactory	**1-4**	**Repeat FNA with ultrasound guidance**
Benign	**0-3**	**Clinical follow-up**
AUS/FLUS	**5-15**	**Repeat FNA**
FN/SFN	**15-30**	**Surgical lobectomy**
Suspicious for Malignancy	**60-75**	**Near-total thyroidectomy or surgical lobectomy**
Malignant	**97-99**	**Near-total thyroidectomy**

Material and Methods

The prospective study is conducted at our tertiary care center in pathology department. It included 160 patients. FNA was done with a 22-23 gauge needle. Smears are stained with Hematoxylin- Eosin stain and examined by pathologists of our institute. Reporting of FNA was done by using Bethesda system for reporting thyroid cytopatholgy. Out of 160 cases, 48 cases underwent surgical excision. Tissue specimens were received in our histology sections which were grossly examined, paraffin processing was done and reported by senior pathologists.

Results

Majority of the patients were in the age range of 21-50years (72.5%), 20.63% were more than 50years, 5% were between 11-20years and 1.88% were between 0-10 years.

The present study showed a female predominance (91.3%) against only 8.8% patients being male.

Out of 160 cases 14 cases were diagnosed as non-diagnostic as per BSRTC. After re-aspiration these cases were categorised into different categories.

Table 2- Distribution of cases in the Bethesda categories as per our study (n=160)

Category	No. of cases	Percentage (%)
I)Non diagnostic	0	0
II)Benign	146	91.25
Colloid/adenomatoid nodule	127	79.38
Hashimoto's thyroiditis	18	11.25
Granulomatous thyroiditis	1	0.63
III)AFLUS	3	1.88
IV)SFN	6	3.75
Follicular neoplasm	2	1.25
Hurthle cell neoplasm	4	2.5
V)SM	2	1.25
Suspicious for papillary carcinoma	2	1.25
VI)Malignant	3	1.88
Papillary thyroid carcinoma	2	1.25
Medullary thyroid carcinoma	1	0.63

Out of the 160 cases reported as per BSRTC, 91.25%(146cases) as benign, 1.88% (3case) as AFLUS, 3.75%(6 cases) were in the IV category suspicious for follicular neoplasm , 1.25%(2case) were suspicious for malignancy and 1.88%(3 cases) were malignant.

Out of 160 cases 48 cases were available for follow up histopathology. Out of these 48 cases, 41 cases had FNA diagnosis as benign, 3 as AFLUS and 1 case as suspicious for follicular neoplasm. We compared the FNA diagnosis of these 48 cases with the diagnoses obtained on HPE and calculated the malignancy risk for each category (Table-3).

Table 3- Comparison of pre-operative FNAC diagnoses with the diagnoses on HPE after surgical resection and calculation of malignant risk for each Bethesda category.

Diagnosis of pre-operative FNAC as per the Bethesda system	Actual diagnosis observed on HPE after surgical resection	No. of cases which turned out to be malignant	Malignancy risk (%)
Benign(n=41)	Follicular adenoma-6 Colloid goiter-29 Hashimoto's thyroiditis-5 Medullary thyroid carcinoma-1	1	2.44
AFLUS(n=3)	Follicular adenoma-1 Hashimoto's thyroiditis-2	0	0
SFN(n=4)	Follicular adenoma -3 Papillary carcinoma-1	1	25

Out of the 146 cases which were reported as benign, specimens of 41 cases were available for the follow up in histopathology. Among these 41 cases 1 was reported as medullary carcinoma thyroid, hence the malignancy risk for this category turned out to be 2.44%.

Out of 4 cases which were reported as SFN, one of them was reported as papillary carcinoma on histopathology, so the malignancy risk for this category is 25%.

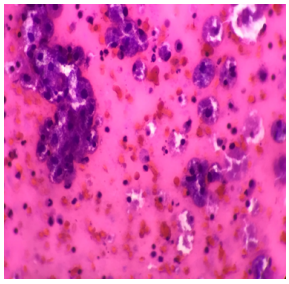

Figure1- Colloid goiter: Photomicrograph showing cyst macrophages and colloid material (H&E,40x10)

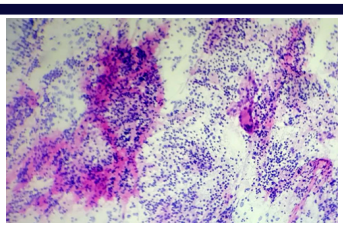

Figure 2- Hashimoto's thyroiditis: Photomicrograph shows follicular cells and few clusters of Hurthle cell. Background shows lymphocytes. (H&E, 10x10)

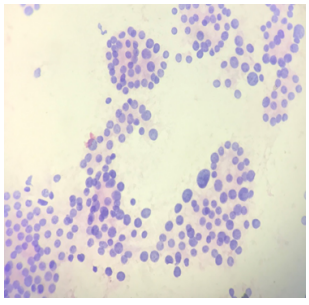

Figure 3- Suspicious for follicular neoplasm: photomicrograph showing cellular smears showing follicular cells arranged in clusters and micro-follicular pattern. (H&E, 10x10)

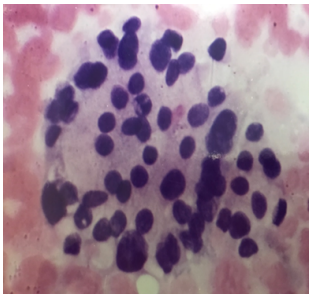

Figure 4- Follicular neoplasm: Photomicrograph shows follicular epithelial cells with nuclear enlargement. (H&E, 40x10)

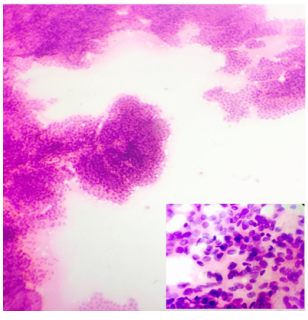

Figure 5- Photomicrograph shows cellular smears having follicular cells arranged in follicular pattern, (H&E, 10x10) inset shows nuclear grooving.

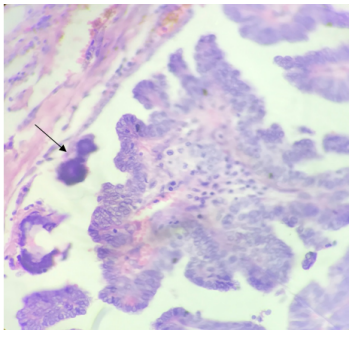

Figure 6- Photomicrograph shows tumor cells arranged in papillary pattern, arrows points to psammoma body. (H&E, 10x10)

Discussion

We were able to trace histology for 48 cases. This comparison was useful to calculate the malignancy risk for each category and also compare the percentage of malignancy risks of each category in present study with other studies.

Table 4- Comparison of the percentage of distribution of fine needle aspiration diagnoses of present study with other studies.

Diagnostic category	Present study (%)	Mondal et al[23] (%)	Jo et al[24] (%)	Yassa et al[25] (%)	Yang et al[26] (%)
II)Benign	91.25	87.5	59	66	64.6
III)AFLUS	1.88	1	3.4	4	3.2
IV)SFN	3.75	4.2	9.7	9	11.6
V)SM	1.25	1.4	2.3	9	2.6
VI)Malignant	1.88	4.7	7	5	7.6

We compared the results obtained in our study with studies of Mondal et al[23], Jo et al[24], Yassa et al[25], Yang et al[26].

The results of our institute on comparing with the other studied revealed that in our study, results in all categories except malignant well matched with the study of Mondal et al[23] but differed with other studies in having a higher percentage of benign cases and lower percentage in all other categories.

As our institute is a tertiary care centre, we also receive a large amount of general population with the referral population. The cases in the benign category are at a high percentage than other studies due to the reason that we provide services to a large amount of general population and most of the population included is not affording FNA studied outside so they come to our institute where the FNA procedure is done free of cost, which is correctly reflected in our study as proportion of benign cases is higher.

Whereas most of the other studied receive more referred cases hence percentage of malignant cases is higher in their studied as explained by Jo et al[24] in his study.

Now the lower percentage of cases in Non diagnostic and AFLUS categories can be explained by the fact that in our institute cytopathologists their selves perform the FNA procedure which leads to a better and adequate yield of material and also the FNA procedures for small or non-palpable lesions as well as the repeat FNAs are done with ultrasound guidance. This may have led to the less number of non-diagnostic or AFLUS cases.

Table 5- Comparison of the percentages of follow up malignancy risk of present study with other studies

Diagnostic category	Present study(%)	Mondal et al[23] (%)	Jo et al[24] (%)	Yassa et al[25] (%)	Yang et al[26] (%)
II) Benign	2.44	4.5	11	0.3	0.7
III)AFLUS	0	20	17	24	19.2
IV)SFN	25	30.6	25.4	28	32.2

The malignancy risk for Bethesda categories benign, AFLUS and SFN, calculated by follow up histology in our study correlated well with the implied risks mentioned in The Bethesda system for reporting thyroid cytopathology. It also correlated well for benign category and SFN category with other studied, except for the AFLUS category, which can be attributed to the smaller denominator population we had in our study.

Also despite of being a tertiary care centre many of the cases in our institute hinting a malignant nature after work up are referred to higher centres for further management which adds to the difference of results in our study and other studies.

Conclusion

The diagnoses of FNA which were reported by Bethesda system were found to be more useful and simple to interpret than the previous pathological terminologies. Also it was easier for the clinicians to plan their further management as the Bethesda system also has management recommendations in it. Bethesda system allows Standardisation in reporting which helps to plan more consistent management approaches. The malignancy risk for SFN reflects the importance of these categories in the six tier Bethesda system.

However study over larger population is needed to know the merits and demerits of this system.

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