Cytomorphological and histopathological study of thyroid lesions in a tertiary care institution

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Abstract

The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) was established for uniformity in the reporting of thyroid lesions.
Objectives: (1) To utilize The TBSRTC for categorization of thyroid FNACs (2) To evaluate the degree of concordance between cytological and histopathological diagnosis.
Materials and Methods: A retrospective analysis of 565 cases was done along with the review of histopathological examination of the specimen excised. Statistical analysis were made comparing the cytological and histopathological findings.
Results: The distribution of 565 thyroid nodules, according to TBSRTC are as follows: 1.9% ND/UNS, 92.0% benign, 0.9% AUS/FLUS, 3.0% FN, 0.4% SFM, and 1.8% malignant. The sensitivity was 64.3%, specificity 99.8%, positive predictive value 90.0% and negative predictive value was 99.0%.
Conclusions: Thyroid FNAs are best reported using TBSRTC. It also provides appropriate guidelines to clinicians for further management.

Keywords: Thyroid cytology, The Bethesda system, Fine needle aspiration.

Introduction

Fine needle aspiration (FNA) cytology is the first mode of investigation of choice for diagnosing thyroid lesions and has high degree of sensitivity and specificity.[1,2] Excision of benign nodules can be prevented if diagnosed accurately. Hence FNAC has been considered to be the "gold standard" investigative tool for selection of patients for surgery.[3]

The Bethesda system for Reporting Thyroid Cytology was framed based on the "Thyroid Fine Needle Aspiration Science Conference" hosted by National Cancer Institute in 2007. This system facilitates easy communication between pathologists and surgeons. The results were easily reproducible among different laboratories.

Materials and Methods

We conducted a retrospective study from January 2014 to December 2016. We retrieved 565 cases of thyroid FNAs from the department of pathology, JJMMC, Davangere. These cases had also undergone further thyroidectomy. The cytological findings were compared with the histopathological features in the excised thyroid specimens.

FNAs were performed using 23G needle and with an airtight syringe. Ultrasound guidance was used whenever necessary. Haematoxylin and Eosin and Papanicolaou stains were used to stain fixed smears and Giemsa stain for air dried smears. TBSRTC was utilized for reporting FNAs. Table 1 shows the categories under TBSRTC and the risk of malignancy.

Inclusion Criteria

All the patients with thyroid lesions who have undergone FNAC and for which histopathological diagnosis is available.

Exclusion Criteria

The patients who have undergone only FNAC without thyroidectomy.

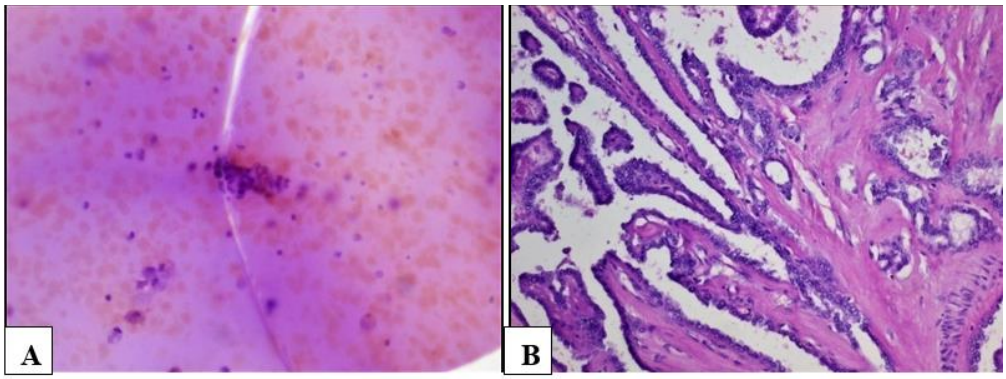
Result

A total of 885 thyroid lesions were aspirated our department. Out of these, a total of 565 cases underwent thyroid excision. Male to female ratio was 1:9.5. Patient's age ranged from 17 years to 65 years. Mean age was 32.4 years. Most of the patients presented with anterior neck swelling which moved on deglutition. Table 2 shows category wise distribution of all the lesions. Amongst Category II, Benign Follicular Nodule (BFN) was the most common diagnosis.

Eleven cases were Nondiagnostic (TBSRTC category I). In Benign (TBSRTC primary category II) 520 cases were diagnosed, amongst which 281(54.0%) were Benign follicular nodule, 44(8.5%) were Colloid Goitre, 185(35.6%) were Hashimoto's Thyroiditis (HT) and 10(1.9%) cases were De Quirvains Thyroiditis.

Under category III there were 5 cases. Seventeen cases were diagnosed as Follicular Neoplasms (Category IV). Two cases were in Category V, out of which one case was Suspicious for Papillary thyroid carcinoma and the other was Suspicious for Anaplastic carcinoma.

Ten cases were diagnosed as malignant (Category VI). Of these, there were 6 cases of Papillary Thyroid Carcinoma (PTC), 3 cases were anaplastic carcinoma and one medullary carcinoma.



Fig, 1: A) Follicular epithelial cells in clusters showing degenerate changes against a background of foamy macrophages and colloid; B) Same case on histopathology revealing PTC

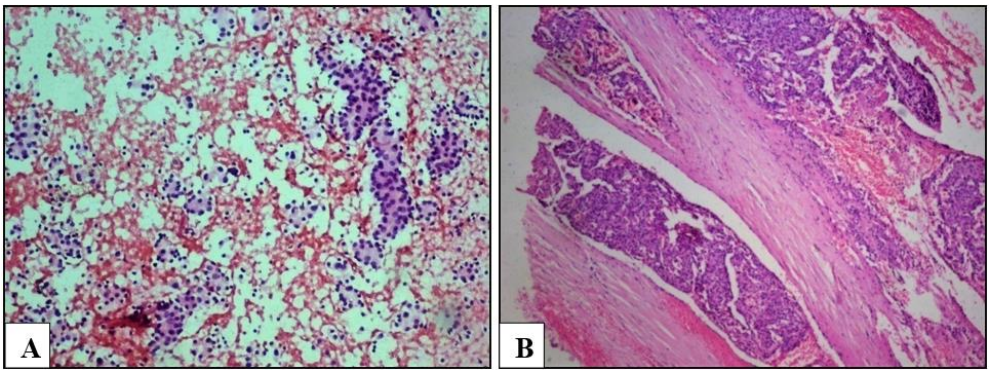


Fig. 2: A) Microfollicular pattern arrangement of cells. B) Histopathology of the same case showing malignant follicular epithelial cells invading the capsule

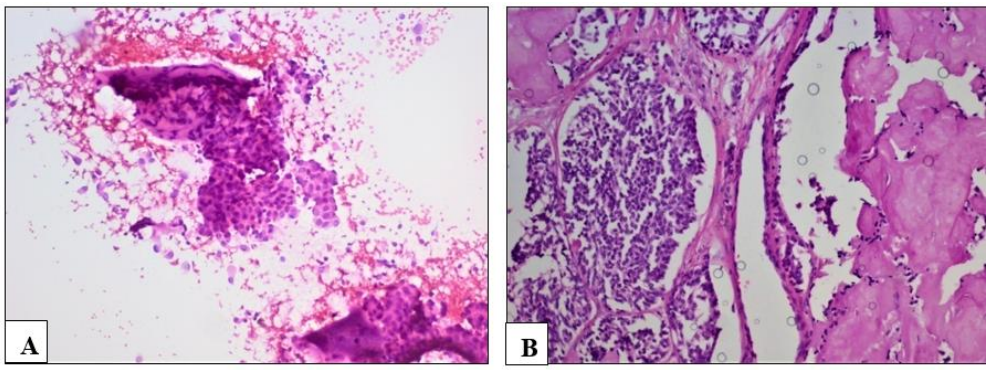


Fig. 3: Medullary Carcinoma of thyroid; A) Plasmacytoid cells in clusters having coarse chromatin; B) Tumor cells arranged in nests with amyloid on the right side

Discussion

In our study there was female preponderance. Female preponderance was also found in studies done by Patel,[5] Unnikrishnan and Menon[6] and Hathila et al.[7]

Under category I there were 11 (1.9%) cases. Yang et al, Nayar et al and other recent studies had 1.2% to 16.4% cases in the same group.[8-15] On histopathological examination, 10 cases turned out to be BFN and 1 case as PTC.

Under category II we had 520 cases (92.0%). BFN was the most common diagnosis followed by Lymphocytic Thyroiditis (LT). This category ranged from 34% to 87.5% in many recent studies.[8-15] There are no reliable cytological criteria to distinguish between cellular nodular goiter, having microfollicular pattern, from follicular adenoma.[16] In 5 cases the diagnosis made was BFN, but on histopathological examination they turned out to be PTC. In 12 cases, a diagnosis of HT was made, but on histopathology they turned out to be BFN.

Under category III we had 5 (0.9%) cases. Several recent studies have reported AUS between 3.2% and 29%.[8-15] According to TBSRTC the proportion of AUS should be ideally less than 7% and should not be used indiscriminately.[18] In our study out of the 5 AUS/FLUS cases, 4 turned to be Multinodular goiter and 1 case was diagnosed as PTC on histopathology.

Under FN/SFN category there were 17 cases (3%). This category ranged from 2.2–16.1% cases in recent studies.[8-15] On histopathological examination 15 cases turned out to be Follicular Adenoma, 1 as Follicular Carcinoma (FC) and the other as Follicular Variant of PTC.

Suspicious for Malignancy category had 2 cases (0.4%). One was suspicious for PTC and the other was suspicious for anaplastic carcinoma. On Histopathology one was diagnosed as Anaplastic Carcinoma and the other as Multinodular goiter. In our case, occasional cells showed intra nuclear cytoplasmic inclusions (INCIs) which led to the over diagnosis of the lesion. It was later noted that INCIs in occasional cells is not specific for PTC and can sometimes be seen in BFN also.

In our study we had 11 (1.9%) cases in the malignant category. This category ranged from 2.9% to 11% in recent studies.[8-15] Comparison of all the 565 cytological diagnosis and its subsequent histopathology diagnosis is given in the table 3.

There were 520 cases in Category 2 and 10 cases in Category 6, a total of 530 cases together. Correlation between cytodiagnosis and histodiagnosis for category 2 (Benign) and category 6 (Malignant) revealed True Positive of 9 cases, 1 False positive case, 515 True negative cases and 5 False negative cases. The details are shown in the table 4.

Upon analysis of the cases of category 2 and category 6 we got the Accuracy rate of 64.3%, Sensitivity of 99.8% and Specificity of 90%. The Positive predictive value was 99% and Negative predictive value 98.9%. These values were similar upon comparison with various studies mentioned in Table 5.

There were 5 False Negative cases. Reviewing the cases again there were no features which were suggestive of malignancy. These cases may have been missed due to sampling error. This can be avoided by USG guided FNAC to target the appropriate nodule. In places where USG is not available then multiple aspirates done from different sites can be done to improve the sensitivity.

Single case of false positive case revealed hyperplastic changes in the follicular epithelial cells, with occasional cells having intranuclear grooves. So a malignancy has to be diagnosed if all the cells show nuclear features of PTC.

Table 1: TBSRTC: Diagnostic categories, Implied risk of malignancy and clinical management[4]

Diagnostic category	Name of the category	Risk of malignancy (%)	Management
I	Nondiagnostic	1–4	Repeat FNA
II	Benign	0–3	Follow-up
III	Atypia of undetermined significance	5–15	Repeat FNA
IV	Follicular neoplasm	15–30	Lobectomy
	Suspicious for malignancy	60–75	Near-total thyroidectomy
VI	Malignant	97–99	Near-total thyroidectomy

Table 2: Cases in each TBSRTC category

Category	No. of Cases	Percentage (%)
Nondiagnostic/Unsatisfactory	11	1.9
Benign	520	92.0
AUS/FLUS	5	0.9
Follicular Neoplasm	17	3.0
Suspicious For Malignancy	2	0.4
Malignant	10	1.8

Table 3: Comparison of cytological diagnosis with histopathology

Category	No. of Cases in cytology	Histopathological diagnosis
Nondiagnostic/Unsatisfactory	11	10-BFN,1-PTC
Benign	520	5-PTC, 276-BFN, 44-CG, 185- HT & 10 De Quervains
AUS/FLUS	5	4-MNG,1-PTC
Follicular Neoplasm	17	15-FA,1FC,1PTC
Suspicious For Malignancy	2	1-PTC, 1-Anaplastic carcinoma
Malignant	10	5-PTC, 1-Medullary Carcinoma, 3-Anaplastic Carcinoma, 1-MNG

Table 4: Correlation between cytodiagnosis and histodiagnosis for category 2 (Benign) and category 6 (Malignant)

	Histology (malignant)	Histology (benign)
Category 6 (malignant)	9	1
Category 2 (benign)	5	515

Table 5: Comparison of diagnostic value for malignant lesions

Parameters	Muratli et al. [5.12] (%)	Kantasueb et al.[5.9] (%)	Bagga and Mahajan [5.5] (%)	This study (%)
Accuracy	77.3	88.40	96.2	98.9
Sensitivity	87.1	74.7	66	64.3
Specificity	64.6	93.22	100	99.8
Positive Predictive Value	76.1	79.49	100	90.0
Negative Predictive Value	79.5	91.29	96	99.0

Conclusion

Fine needle aspiration cytology is an extremely useful technique for thyroid lesions and are best categorized using TBSRTC. It also has high Accuracy, Sensitivity and Specificity as evident by our study and various other authors also. USG guided FNAC may be done to improve the sensitivity and reduce false negative cases in clinically suspicious cases. By comparing these lesions with histopathological morphology, one can improvise their morphology by reviewing the FNAC slides and can minimize the diagnostic mistakes.

Conflict of Interest: None.

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