

Original Research Article

A Comparative study between conventional method and the Bethesda system for reporting thyroid cytopathology (TBSRTC)

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ABSTRACT

Background: FNAC is widely used for the diagnosis of thyroid lesions. TBSRTC was introduced to streamline the reporting of thyroid aspirates. Objectives was to study the spectrum of various thyroid lesions in and around Meerut and comparison of conventional method and TBSRTC.

Methods: A total of 464 patients were evaluated both by conventional system and TBSRTC.

Results: As per conventional system of reporting, maximum number of cases were diagnosed as benign (87%), followed by malignant (6.4%), follicular neoplasia (2.5%), equivocal (2.1%) and inadequate (1.7%). As per TBSRTC, maximum number of cases were reported as category 2, 86.2% followed by category 6, 6%, category 1, 2.5% and cat 3, 2.5%, category 4, 1.5% and category 5, 1%. Among benign category, maximum number of cases were of colloid goiter/multinodular goiter (MNG) (65%) followed by Hashimoto's thyroiditis (15%), Grave's disease (6%). Among the malignant category, maximum number of cases were of papillary carcinoma thyroid (PCT) (5.3%) followed by medullary carcinoma thyroid (MCT) (0.43%), non-Hodgkin's lymphoma NHL (0.21%), metastatic carcinoma (0.21%), and anaplastic carcinoma (0.21%) of each.

Conclusions: In present study it was found that there is an excellent agreement between the conventional system and TBSRTC. Results of both systems of reporting are comparable. In some cases, TBSRTC is almost equivalent to the conventional system in the pattern of reporting (viz. benign and malignant cat) while in some cases, TBSRTC is better in reporting (viz. FN and equivocal cat). The sensitivity of TBSRTC (93%) is slightly more as compared to the conventional system (90%) while its specificity (86%) slightly less as compared to conventional system (88%). Thus, as compared to the conventional system, TBSRTC may be viewed as a better screening test for thyroid lesions, though at the cost of specificity.

Keywords: Conventional method, FNAC, Grave's disease, Hashimoto's thyroiditis, MCT, PCT, TBSRTC

INTRODUCTION

Disorders of thyroid gland are very common. Iodine deficiency disorders (IDD) and colloid goiter are endemic in some parts of India and are considered as a national health issue. Thyroid cancer comprises 1% of all malignancies.¹ It is the most common cancer of the endocrine system. It is more common in females as compared to males.² Fine needle aspiration cytology

(FNAC) is safe, inexpensive, cost effective and provides rapid result which helps in better patient selection for surgery.

Interpretation of thyroid FNAC smears is not easy because of considerable similarity and overlaps between benign and malignant conditions especially the follicular patterned lesions. The maximum confusion is caused between follicular lesions and hyperplastic nodules.

Since 1970s, various reporting formats of thyroid FNAC have appeared in the literature. These have included schemes with two categories (benign and malignant) to six or more categories.

In October 2007, The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) was discussed and finalized in a conference.³ TBSRTC classifies all the thyroid nodules into six general categories viz.

- Non-diagnostic/Unsatisfactory (ND);
- Benign (B);
- Atypia of Undetermined Significance/Follicular Lesion of Undetermined Significance (AUS/FLUS);
- Follicular Neoplasm/Suspicious of Follicular Neoplasm (FN);
- Suspicious of Malignancy (SM);
- Malignant (M).

Conventional system of reporting classifies all the thyroid lesions into five categories:⁴

- Inadequate
- Benign
- Equivocal
- Follicular neoplasia
- Malignancy.

Aims and objectives was to study the spectrum of various thyroid lesions in and around Meerut and comparison of conventional system and TBSRTC.

METHODS

The present study was done on total of 464 patients, who presented with thyroid swellings, were evaluated both by conventional system and TBSRTC.

Inclusion criteria

All patients who were advised thyroid FNAC and willing to participate in the study were included.

Exclusion criteria

Patients unwilling to participate in the study.

Clinical workup

Clinical history of the patients was taken pertaining to the following:

- Name, age and gender.
- History of neck swelling including duration, increase in size and pain in the swelling.
- Symptoms of thyroid dysfunction-cold/heat intolerance, loss/gain of appetite and weight, anxiety, edema, tremors, and menstrual history in female patients.

- Complications- compressive symptoms (dysphagia and/or dyspnea), hoarseness of voice, neck nodes, bone pains etc, family history and any other relevant history.

Clinical examination

Clinical examination was performed including local and systemic examination:

- Thorough examination of the neck swelling was done- location, dimension, nature (diffuse/nodular, soft/firm), tenderness, overlying skin (erythema, ulceration etc.) and movement with deglutition were recorded.
- Cervical lymphadenopathy including presence of any supraclavicular lymph node.
- Patients were examined for presence of signs of hypo or hyper
- thyroidism like pulse, tremors, eye signs, dry skin etc.
- Hoarseness of voice and any other relevant findings were noted.

Investigations

Neck radiography, ultrasound, thyroid function tests, thyroid scan any prior cytological / histological findings, any other other relevant investigations were noted wherever available.

Written and informed consent was taken from all the patients and the procedure was explained to them. FNAC was done using a 23/24gauge needle, under aseptic precautions as per the standard technique. The procedure was repeated from multiple sites to obtain adequate and representative sample. USG guidance was employed when needed. The aspirated material was smeared onto clean glass slides. 2-3 smears were air dried, fixed in methanol for 10 min at room temperature and then stained with Giemsa stain. 1-2 smears were wet fixed and were stained for papanicolaou stain.

RESULTS

As evident from Table 1, out of total 464 cases, maximum number of cases were of benign lesions, 404 cases (87%), followed by malignant, 30 cases (6.4%), follicular neoplasm, 12 cases (2.5%), equivocal 10 cases (2.1%) and 8 cases (1.7%) were reported as inadequate. Among the benign lesions, maximum number of cases were of colloid goiter/multinodular goiter, 294 cases (63.3%) followed by Hashimoto's thyroiditis, 70 cases (15.0%).

Among the malignant, maximum number of cases were of papillary carcinoma of thyroid, 25 cases (5.3%) followed by medullary carcinoma of thyroid, 2 cases (0.43%).

Table 1: Spectrum of total thyroid lesions as per conventional system (N=464).

Diagnosis	No. of cases	%
Benign	404	87
1 Colloid goitre/mng	294	63.3
2 Hashimoto's thyroiditis	70	15.0
3 Grave's disease	30	6.4
4 Adenomatous goitre	10	2.1
Malignant	30	6.4
1 Papillary carcinoma	25	5.38
2 Medullary carcinoma	02	0.43
3 NHL	01	0.21
4 Metastasis	01	0.21
5 Anaplastic carcinoma	1	0.21
Follicular neoplasia	12	2.5
Equivocal	10	2.1
Inadequate	8	1.7
Total	464	100

Twelve cases (2.5%) were reported as follicular neoplasia (FN), 10 cases (2.1%) cases were reported as equivocal and 8 cases (1.7%) were reported as inadequate. Inadequate smears are those which contain cyst fluid, acellular smears or smears having blood only.

All the cases were reported using the conventional as well as The Bethesda system for Reporting Thyroid Cytopathology (TBSRTC). The distribution of cases according to the categories of the conventional as well as TBSRTC is shown in Table 2 and Table 3 respectively.

Table 2: Categorywise distribution of cases as per conventional system of reporting (N=464).

Category	No. of cases	%
Inadequate	8	1.7
Benign	404	87.0
Equivocal	10	2.1
Follicular neoplasia	12	2.5
Malignancy	30	6.4
Total	464	100

Table 4: Comparison of present study with other studies as per TBSRTC.

TBSRTC	Present study	Mondal et al ⁵	Theoharis ⁶	Bongiovanni ⁷
Cat1	12(2.5%)	12(1.2%)	357(11.1%)	3271(12.9%)
Cat2	400(86.2%)	893(89.3%)	2368(73.8%)	15104(59.3%)
Cat3	12(2.5%)	10(1.0%)	95(3%)	2441(9.6%)
Cat4	7(1.5%)	43(4.2%)	176(5.5%)	2571(10.1%)
Cat5	5(1.0%)	14(1.4%)	43(1.4%)	680(2.7%)
Cat6	28(6%)	48(4.7%)	168(5.2%)	1378(5.4%)
Total	464(100%)	1020(100%)	3207(100%)	25445(100%)

Thyroid nodules are a common clinical problem and FNAC of the thyroid is the key preoperative investigation

As evident from Table 2, maximum number of cases were diagnosed as benign category, 404 cases (87.0%) while 30 cases (6.4%) as malignant, 12 cases (2.5%) as follicular neoplasia, 10 cases (2.1%) as equivocal and 8 cases (1.7%) as inadequate.

As evident from Table 3, maximum number of cases were reported as Benign (category 2), 400 cases (86.2%) while 28 cases (6.0%) as malignant (category 6), 12 cases (2.5%) as atypia of undetermined significance (cat 3), 7 cases (1.5%) as follicular neoplasia (category 4), 5 cases (1.0%) as suspicious for malignancy (category 5) and 12 cases (2.5%) as non-diagnostic/ unsatisfactory (category 1).

Table 3: Category wise distribution of cases as per TBSRTC (N=464).

Category	No. of cases	%
Cat 1 Non diagnostic/Unsatisfactory	12	2.5
Cat 2 Benign	400	86.2
Cat 3 Atypia of undetermined significance	12	2.5
Cat 4 Follicular neoplasia	07	1.5
Cat 5 Suspicious for malignancy	05	1.0
Cat 6 Malignant	28	6.0
Total	464	100

DISCUSSION

The study included a total of 464 patients whose thyroid FNAC smears were evaluated. Majority (88.2%) of the patients were female. As evident from Table 1, maximum number of cases were of benign lesions (87%) and most common lesion was colloid goitre/multinodular goitre.

Among malignant category, most common was papillary carcinoma of thyroid (5.38%). FN was 2.5% and equivocal was 2.1%. Inadequate was 1.7%. Smears having cyst fluid only, acellular smears or with blood only or smears not fulfilling the adequacy criteria were considered as inadequate.

of thyroid lesions. Fortunately, the vast majority of nodules are benign, but when they are discovered, an

assessment regarding the need to exclude malignancy using FNA must be performed.⁸ It 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 may increase the reproducibility of diagnosis.⁹ Each diagnostic category conveys specific risks of malignancy, which offers guidance for patient management.¹⁰ The reporting is based upon number of stepwise descriptions.

Table 4 shows other studies who used TBSRTC and their category wise distribution which includes a meta analytic al study by Bongiovanni et al.

As evident from Table 4, in category 1 percentage of cases in present study was 2.5%, in study of Mondel et al, was 1.2%, in study of Theoharis et al, was 11.1% and in study of Bongiovanni et al, was 12.9%. Hence in category 1 results of present study correlates with study of Mondal et al.

In category 2, percentage of cases in present study was 86.2%, in study of Mondel et al was 89.3%, in study of Theoharis et al, 73.8% and in study of Bongiovanni et al 59.3%. Hence in category 2 results of present study correlates well with study of Mondel et al.

In category 3, percentage of cases in present study, study of Mondel et al, Theoharis et al and Bongiovanni et al was 2.5%, 1 %, 3%, and 9.6% respectively. Hence in this category results of present study correlates well with study of Theoharis et al.

In category 4, percentage of cases in present study, study of Mondel et al, Theoharis et al and Bongiovanni et al was 1.5%, 4.2%, 5.5% and 10.1% respectively.

In category 5, percentage of cases in present study, study of Mondel et al, Theoharis et al, and Bongiovanni et al, was 1%, 1.4 %, 1.4%, and 2.7% respectively. Hence in this category results of present study correlates well with study of Mondel et al and Theoharis et al.

In category 6, percentage of cases in present study, study of Mondel et al, Theoharis et al and Bongiovanni et al was 6 %, 4.7%, 5.2%, and 95.4% respectively. Hence in this category results of present study correlates well with study of Theoharis et al and Bongiovanni et al.

Thus, there is significant difference between present study and the meta analytical study by Bongiovanni et al in the category wise distribution of cases except for category 6 where distribution is not significantly different. In our opinion, epidemiology of thyroid lesion may be responsible for the difference in the proportion of the cases in the categories. Iodine deficiency disorders and colloid goitre are known to be endemic in India with

a greater prevalence as compared to the western countries. This may have led to more proportion of cases being diagnosed as benign with consequent decrease in the other categories.

The other reason may be our tendency to use the AUS and the SM category less often, probably due to newness of the category. Other reason for number of cases in the benign category being higher can be attributed to the fact that, our institute, despite being a tertiary care centre, not only caters to the needs of patients on a referral basis, but also patients come here directly without referral. So, a large population, representative of the general population, is encountered in our institute. Therefore, the proportion of benign cases that is a lot higher in the general population, is reflected proportionately in present study. Present study correlates well with study of Mondal et al. Comparative analysis with other studies is shown in Table 5.

The sensitivity and specificity of our study with Bethesda system proved to be 93% and 86% respectively. When compared with similar studies we found that our findings were consistent with other studies like Yassa L et al and Deepak J et al which was conducted on 268 and 110 cases respectively.¹¹

Frank benign and malignant cases does not pose diagnostic difficulties and majority of the cases can be reported without difficulty.¹²

However, there is a grey zone area consisting of overlapping entities like adenomatous goiter, FA and FCa referred collectively as follicular patterned lesions. Not only cytology, even the histological diagnosis is at times difficult. This may be due to the fact that all the three lesions involve follicular cell hyperplasia with the difference being the clonality between the neoplastic and non neoplastic lesion.

To summaries, we feel that on statistical basis there is not much difference between the conventional and TBSRTC. However, TBSRTC offers advantage of being more reproducible and more management oriented. But the category 3 is heterogenous and its usage still has large influence of subjectivity. Thus, larger studies are needed to refine the criteria for this category.

Also, there are certain areas like the follicular patterned lesions which pose diagnostic and management dilemma irrespective of the system used.

Authors thus feel that cytology can be the one of the best investigative tool for assessing thyroid nodules. In cases with equivocal results on cytology, we feel that using TBSRTC recommended management may not be appropriate for all patients and that the treatment plan should be individualized taking into consideration all other investigation, clinical profile and patients wish

CONCLUSION

There is an excellent agreement between the conventional system and TBSRTC, and results of both systems of reporting are comparable. In some cases, conventional system is almost equivalent to TBSRTC (viz. benign and malignant cat) while in some cases, TBSRTC is better than conventional system (viz. FN and equivocal cat). The sensitivity of TBSRTC (93%) is slightly more as compared to the conventional system (90%) while its specificity (86%) slightly less than conventional system (88%). Thus, as compared to the conventional system, TBSRTC may be viewed as a better screening test for thyroid lesions though at the cost of specificity.

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REFERENCES

1. De Lellis RA, Lloyd RV, Heitz PU, Eng C, editors. WHO classification of tumors: pathology and genetics of tumors of endocrine organs. Lyon international agency for research on cancer. IARC Press;2004.
2. Schlumberger MJ. Papillary and follicular thyroid carcinoma. N Engl J Med. 1998 Jan 29;338(5):297-306.
3. Cibas ES, Ali SZ. NCI thyroid FNA state of the science conference The Bethesda system for reporting thyroid cytopathology. Am J Clin Pathol. 2009;132(5):658-65.
4. Wang HH. Reporting Thyroid Fine Needle Aspiration: Literature review and a proposal. Diagn Cytopathol. 2006 Jan;34(i):67-76.
5. Mondal SK, Sinha S, Basak B, Roy DN, Sinha SK. The Bethesda system for reporting thyroid fine needle aspirates: A cytologic study with histologic follow-up. J Cytol/Ind Aca Cytologists. 2013 Apr;30(2):94.
6. Theoharis CG, Schofield KM, Hammers L, Udelsman R, Chhieng DC. The Bethesda thyroid fine-needle aspiration classification system: year 1 at an academic institution. Thyroid. 2009 Nov 1;19(11):1215-23.
7. Bongiovanni M, Spitale A, Faquin WC, Mazzuccheli L, Baloch ZW. The Bethesda system for reporting thyroid cytopathology: a meta analysis. Acta Cytol. 2012;56(4):333-9.
8. Langer JE, Baloch ZW, Mc Grath C, Loevner LA, Mandel SJ. Thyroid nodule fine needle aspiration. Semin Ultrasound CT MR. 2012;33:158-65.
9. Goellner JR, Gharib H, Grant CS, Johnson DA. Fine needle aspiration cytology of the thyroid, 1980 to 1986. Acta cytologica. 1987;31(5):587-90.
10. Grant CS, Hay ID, Gough IR, McCarthy PM, Goellner JR. Long-term follow-up of patients with benign thyroid fine-needle aspiration cytologic diagnoses. Surgery. 1989 Dec 1;106(6):980-6.
11. Yassa L, Cibas ES, Benson CB, Frates MC, Doubilet PM, Gawande AA, et al. Long-term assessment of a multidisciplinary approach to thyroid nodule diagnostic evaluation. Cancer Cytopathol: Inter Inter J Am Cancer Soci. 2007 Dec 25;111(6):508-16.
12. Gupta M, Gupta S, Gupta VB. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. J thyroid research. 2010;2010.

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