Original Article

An analysis of thyroid cytology reporting in three peripheral hospitals in Sri Lanka

S. K. Senanayake[1], K.W. Dammika[2], E.M.D.P.K. Edirisuriya[2], I.D.B.D. Premarathna[1] and A.M.S.A. Liyadipitiya[3]

[1] Department of Pathology, Base Hospital Homagama; [2] Department of Pathology, Base Hospital Awissawella; [3] Department of Pathology, Base Hospital Karawanella

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Summary

Thyroid cytology is a widely used, cost effective outpatient procedure, which can be easily utilized in resource limited peripheral hospitals, available for preoperative assessment of thyroid nodules. We conducted the following study to analyze thyroid cytology reporting in three peripheral hospitals in Sri Lanka to assess their diagnostic utility, identify the associated problems and make recommendations for further improvement. This was a retrospective study performed on 300 thyroid cytology cases with a histological diagnosis. Thyroid cytology was reported according to BTA/RCP guidelines. Of the cytology diagnosis categories 72.7% were Thy 2, 22.3% were Thy 3, 4.7% were Thy 4 and 0.3% were Thy 5 lesions. Malignancy detection rate for each category were 2.3% for Thy 1, 13.4% for Thy 2, 64.3% for Thy 3 and 100% for Thy 4. The test had a 66.7% sensitivity, 97.7% specificity, 66.8% positive predictive value and 97.7% negative predictive value in diagnosing a malignancy. These parameters are comparable with the published parameters. However, the sensitivity of the test in the three hospitals showed significant variability. Concerted use of clinical and ultrasound findings in the interpretation of smears and multidisciplinary team meetings to discuss equivocal cases can be used to improve the diagnostic utility of thyroid cytology in these hospitals. Furthermore, performance of regular internal audits for each institution to identify problems is important since the study has shown variations in diagnostic parameters in different hospitals.

Key words- Thyroid cytology, Thy 3 category, Peripheral hospitals of Sri Lanka

Introduction

Thyroid malignancy is the third leading malignancy among females, after breast and uterine cervical malignancies, in Sri Lanka (1). The crude rate of thyroid malignancy is 8.0 among females (per 100,000) and 5.0 for both sexes (NCCP 2010) (1). The life time risk of thyroid malignancy for a Sri Lankan female is 0.7% and 0.2% for a male (1). Thyroid cytology is a first line investigation for assessing thyroid nodules. The role of fine needle aspiration cytology (FNAC) of thyroid is to triage the thyroid nodules according to their risk of being malignant in order to determine

Author for correspondence: S. K. Senanayake (MBBS, Dpath, MD) Department of Pathology, Base Hospital Homagama. E mail: kumudusenanayake@yahoo.com

the management of the lesion as surgical or conservative (2).

Concerted use of radio-imaging (mainly ultrasound) with FNAC has improved the utility of FNAC in evaluation of thyroid nodules (3- 5). Ultrasound guided fine needle aspiration (FNA) is known to reduce sampling errors and enable sampling of deep seated small lesions. As a result, nowadays the standard practice is to perform ultrasound guided FNA to evaluate the suspicious nodules. However, in many peripheral/community based hospitals in developing countries often the palpation guided FNA is performed and radilogical features are not available when cytology intrepretation is done. Moreover, FNAC is a simple low cost procedure that is very much suited for low resource conditions in peripheral hospitals. Therefore, we conducted the following study to assess thyroid cytology reporting in three peripheral hospitals in Sri Lanka in order to make recommendations to improve the diagnostic utility of the test in these settings.

Materials and Methods

This is a retrospective study of thyroid cytology reported at the Base Hospitals Homagama, Balapitiya and Avissawella, Sri Lanka over a one year period from 2013. Archived thyroid cytology reports were traced and those with a follow up thyroidectomy and a histological diagnosis were selected for the study. Accordingly, 300 cases were included for the study. Palpation guided FNA have been performed and the smears interpreted by the same histopathologist. The types of nodules that have been assessed were solitary thyroid nodules and dominant or other suspicious nodules in a multinodular goiter on palpation. In each case interpretations were done in adequately cellular smears only. Smears were stained with haematoxylin and eosin stain. Thyroid smears were reported according to the British Thyroid Association/ Royal College of Pathologists (BTA/RCP) guidelines (Table 1) (6).

The diagnostic ability of FNAC of thyroid was evaluated, against histology as the gold

Table 1. Definitions of diagnostic categories used in the study according to the British Thyroid Association/ Royal College of Pathologists guidelines (6).

Category	Lesions included
Thy 1	Inadequate smears
Thy2	Non neoplastic lesions such as colloid nodules, cystic colloid nodules, hyperplastic nodules, thyroiditis etc.
Thy3	Indeterminate lesions in which atypical cellular features are mild therefore, do not warrant a Thy 4 diagnosis: lesions in which follicular neoplasms cannot be excluded; lesions in which focal cytological atypia is present – probably benign but papillary carcinoma cannot be excluded, cysts with atypical cells, lesions predominantly containing oncocytes etc.
Thy4	Suspicious for malignancy
Thy5	Malignant

Thy 3f category has not been seperately reported.

standard method, in terms of sensivity, specificity and predicitive values. Thy 3 which is an equivocal category was excluded from the calculation. The histological correlation and malignant risk were calculated for each category.

Results

Of the cytology diagnosis categories 72.7% were Thy 2, 22.3% were Thy 3, 4.7% were Thy 4 and 0.3% were Thy 5 lesions (Table 2). Percentages of presence of histologically malignant tumours in each category were 2.3% for Thy 2, 13.4% for Thy 3, 64.3% for Thy 4 and 100% for Thy 5. The details of the histological lesions diagnosed for each category have been outlined in Table 2.

Table 2 Summary of thyroid cytology categories reported and their histological correlation in the three peripheral hospitals under study.

FNAC Diagnosis	Number	Histological Diagnosis	Number
Thy 2	218 (72.7%)	Non neoplastic	213 (97.7%)
		Colloid storing nodule	98
		Hyperplastic nodule	55
		Thyroiditis	60
		Benign neoplasm (adenoma)	00
		Malignant neoplasms	05 (2.3%)
		Papillary carcinoma	05
		Follicular carcinoma	00
		Medullary carcinoma	00
		Other	00
Thy 3	67 (22.3%)	Non neoplastic	40 (59.7%)
		Colloid storing nodule	00
		Hyperplastic nodule	32
		Thyroiditis	08
		Benign neoplasm (adenoma)	18 (26.9%)
		Malignant neoplasms	09 (13.4%)
		Papillary carcinoma	05
		Follicular carcinoma	04
		Medullary carcinoma	00
		Anaplastic carcinoma	00
Thy 4	14 (4.7%)	Non neoplastic	05 (35.7%)
		Colloid storing nodule	00
		Hyperplastic nodule	03
		Thyroiditis	02
		Benign neoplasm (adenoma)	00
		Malignant neoplasms	09 (64.3%)
		Papillary carcinoma	09
		Follicular carcinoma	00
		Medullary carcinoma	00
		Anaplastic carcinoma	00
Thy 5	01 (0.3%)	Anaplastic carcinoma	01 (100%)

Table 3. Comparison of diagnostic parameters in the three peripheral hospitals under study

Hospital	Sensitivity	Specificity	Thy3 category
A	33.3%	98.7%	27/106 (25.5%)
B	80.0%	96.3%	29/130 (22.3%)
C	50.0%	98.4%	11/74 (14.9%)

When Thy 4 and Thy 5 categories were considered as positive for malignancy and the Thy 3 category was excluded, the test has a sensitivity of 66.7%, specificity of 97.7%, positive predictive value (PPV) of 66.8% and negative predictive value (NPV) of 97.7% in predicting malignancy. Diagnosis of thyroid cytology in each institution is outlined in Table 3.

Discussion

According to the results, FNAC of thyroid has a superior ability to diagnose benign/non neoplastic lesions with a NPV of 97.7%. Hence, Thy 2 is the most reliable category and this is a universally observed fact (2,7,8). Moreover, the 67% sensitivity and PPV in this study makes FNA thyroid less than reliable to make a diagnosis of a malignancy on its own. The reasons for this observation can be multifactorial: interpretation skill and the experience of the interpreter, limited availability of radiological findings, sampling errors and presence of micropapillary carcinoma in the histological diagnosis are several possible reasons. Reporting on samples with inadequate cellularity has also been cited as a casue of misinterpretation (2). However, in the present study, all samples have been reported on adequately cellular smears. The observation of relatively low sensitivity and PPV of the test emphasizes the requirement of concerted use of clinical, radiological and biochemical information in the interpretation of thyroid cytology. The value of such multidisciplinary approach has repeatedly been emphasized in the literature and professional guidelines (2, 7). In the published literature the diagnostic parameters of FNAC of thyroid have shown wide variations such a sensitivity 65 – 98% and specificity 76 – 100% (2). In the local literature the sensitivity and specificity varied from 77.8 to 94.1% and 86.7 – 96.8% respectively (9 -11). Other than the above discussed reasons, such wide variability of diagnostic efficacy indicators are also due to use of various reporting systems and the way calculations are done in these studies (2). However, comparison of malignancy rate in each diagnostic category in the present study with published data reveals that our results are comparable with the results of other institutions in the world (Table 4).

Thy 3 category is heterogeneous. Indeterminate thyroid cytology diagnosis accounted for 5-30% (12) and the malignancy rate in this category varied between 3% and 52% (13 -15). In the present study, although most lesions diagnosed as Thy 3 were shown to be benign, 13.4% have been malignant by histology. Because of the heterogeneity of this category there is much ambiguity with regard to management of thyroid nodules with Thy 3 diagnosis (2, 7, 13). Some studies have revealed that reporting on smears with inadequate cellularity is a common reason for categorizing lesions as Thy 3 and reporting on repeat FNA with adequate cellularity enabled to recategorize many of such lesions under more definitive categories (2). RCPath recommends repeat cytology and review of cytology in MDT meetings to decide mangement for Thy 3 category. In the Bethesda system Thy 3 category is comparable to BTS III and BTS IV categories and repeat FNA in three months is recommended for BTS III and referral to a specialist for BTS IV (7). Ultrasound guided FNAC and on site assessment of thyroid

Table 4. Malignancy detection rate in each thyroid cytology diagnostic category: comparison of the result of the present study with the published data (2).

Diagnostic Category (RCP* or BTS**)	Malignancy risk	
	Present study	Published data (2)
Thy 2/BTS II Benign	2.3%	<3%
Thy 3a/BTS III Neoplasm possible – atypia/non-diagnostic - Thy 3a Atypia of undetermined significance or follicular lesion of undetermined significance - BTS III		5 – 15%
Thy 3f/BTS IV Neoplasm possible – suggesting follicular neoplasm Thy 3f Follicular neoplasm or suspicious for a follicular neoplasm BTS IV	13.4%	15 – 30%
Thy4/ BTS V Suspicious for malignancy	64.3%	60 – 75%
Thy 5/BTS VI Malignant	100%	97 – 100%

smears have shown to reduce the number of inadequate smears (3-5, 16). In the current study although ultrasound guidance was not used, all samples have been assessed and only adequately cellular smears have been reported.

Thy 3 is an equivocal category not welcomed by the surgeons and pathologists should try to keep the numbers of Thy 3 reported to a minimum by measures such as improving adequacy of the smears, interpretation skills and greater utility of clinical and radiological information in the interpretation of smears. However, at the same time, the importance of having the Thy 3 category should not be underestimated. Correct utility of this category indicates to the clinicians the presence of lesions that show truly overlapping cytological features (17). Therefore, inclusion of thy 3 category increases the reliability of Thy 2 and Thy 4 categories and improves the diagnostic parameters of FNAC thyroid.

The three peripheral hospitals in the study have performed and interpreted the thyroid smears under similar circumstances. However, as shown in the Table 3, although the specificity of the test is consistently high in the three hospitals, the sensitivity has shown variations. Therefore, it is important that each institution conducts their own internal audits and have their diagnostic efficacies assessed and underlying problems identified.

In conclusion, the diagnostic parameters of FNAC thyroid performed in the peripheral hospitals of Sri Lanka are comparable with the published parameters. Measures such as improved use of clinical and ultrasound information, use of ultrasound guided aspirations for nonpalpable lesions and multidisciplinary team meetings to discuss equivocal cases, can be used to improve the diagnostic utility of thyroid cytology in preoperative assessment of thyroid nodules in these hospitals. Furthermore, since the study

has shown variations in sensitivity of the test in different institutions, performance of regular internal audits in each instituition to identify problems and improve the quality of the service is indicated.

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