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Inter-observer reproducibility of the Royal College system for reporting thyroid cytology: Experience of the Egyptian National Cancer Institute

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ABSTRACT

Purpose: To assess the inter-observer agreement between 3 cytopathologists of thyroid FNAC using Royal College of Pathology reporting system.

Patients and methods: The study is a retrospective one conducted on 204 cases retrieved from the archives of the Cytology Unit, Pathology Department, National Cancer Institute, Cairo University during the time period from January 2016 to December 2016. Cases were diagnosed separately by 3 cytopathologists using the Royal College of Pathology classification system (RCPath), where Thy1, nondiagnostic; Thy2, nonneoplastic; Thy3a, atypical, Thy3f, follicular lesion; Thy4, suspicious of malignancy; and Thy5, malignant. Kappa statistics were used where combination of the agreement between the 3 observers simultaneously was done.

Results: There was a good overall agreement between the three observers regarding all categories (kappa statistics was 0.679). Perfect agreement was reported for Thy5 category ($\kappa = 0.874$), good agreement was observed for Thy1 and Thy2 ($\kappa = 0.784$ and 0.719, respectively). For Thy3a, Thy 3f and Thy 4, a moderate agreement was reported ($\kappa = 0.407$, 0.446 and 0.453 respectively). Combination of surgical categories (Thy3f, Thy4, and Thy5) achieved a good agreement ($\kappa = 0.701$) as well as for non-surgical categories (Thy1, Thy2, and Thy3a) ($\kappa = 0.712$).

Conclusion: RCPath reporting system for thyroid FNAC is clinically applicable and can be used for differentiation between benign cases needing observation and follow up on one hand, and malignant cases requiring surgical intervention on the other.

The least inter-observer agreement (moderate agreement) was detected for Thy3a, Thy3f and Thy4 categories, necessitating multidisciplinary team meeting before any clinical decision.

Introduction

Fine needle aspiration cytology (FNAC) is widely used nowadays for pro-operative assessment of thyroid lesions. FNAC can classify about 70–80% of thyroid lesions into benign or malignant [1].

It has been recommended to be the initial line for thyroid nodule investigation, having sensitivity ranging from 65 to 98%, specificity of 76–100%, a false-positive rate of 0–5.7%, a false-negative rate of 0–5% and a total accuracy of 69–97% [2].

The main aim of cytological report is to interpret the morphological appearance of the specimen and convert it to clear information to the clinician, which will help him to make a decision about patient management [3].

Historically, the diagnostic terminology for diagnosis of thyroid lesions has varied markedly between different laboratories, thus causing uncertainty in some cases with difficulty in patient care. Recently, many terminologies for reporting thyroid gland FNAC have been used, which when used appropriately, they could permit better description of lesions, better identification of prognosis, malignant risk assessment, and improve the inter-observer agreement between cytologists, which in turn help clinicians to select the optimum treatment for the patient [4].

The Bethesda System for Reporting Thyroid Cytology (TBSRTC) was introduced in 2007 to overcome the limitations of previous terminologies. TBSRTC included 6 diagnostic categories from benign to intermediate category called *atypia of undetermined significance (AUS)/follicular lesion of undetermined significance (FLUS)*

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and follicular neoplasm (FN)/suspicious for follicular neoplasm (SFN), to malignant [5].

As there was a need for report standardization, The Royal College of Pathologists (RCPath) has updated the reporting system actually used in the UK since 2003. RCPath has used many diagnostic criteria that are similar to TBSRTC [6].

The RCPath terminology is based on Thy categories of the British Thyroid Association strategy (Thy1 to Thy5), retaining the original categories, while expanding the definition of each category to help their use [7].

The efficacy of interobserver reproducibility study is reflected by good agreement between different observers regarding benign and malignant categories, which will help both cytopathologists and clinicians [8].

To the best of our knowledge, there are a small number of studies in literature evaluating interobserver reproducibility of thyroid FNAC using RCPath reporting categories, that were done on large numbers of patients with multiple cytopathologists, and a standardized, evidence-based reporting terminology.

Aim of the work

The aim of this study was to assess the inter-observer agreement between three cytopathoogists in the evaluation of the categories of RCPath reporting system for thyroid FNAC.

Patients and methods

A total of 204 thyroid FNA cases were retrieved from the archives of the Cytology Unit, Pathology Department, National Cancer Institute (NCI), Cairo University during the time period from January 2016 to December 2016.The majority of our study cases were aspirated in the Radiodiagnosis Department, NCI, under ultrasonography guidance. Few cases with palpable single thyroid nodules were aspirated in the Cytology Unit. At least four smear slides were prepared for each case from at least two aspirations. Each case was reviewed separately by 3 cytopathologists and independent diagnoses were put according to the UK Royal College of Pathologists' Classification System. The cases were rotated among the 3 observers in packages of a minimum of 10 cases per week in a period of approximately 3 months. All available relevant clinico-radiologic data for the studied cases such as patient's age, gender, number and size of the aspirated nodule(s) and their ultrasound characteristics were supplied for the three examining cytopathologists. The original cytological diagnoses of the studied cases were not disclosed to the cytopathologists reviewing the cases. The available corresponding histopathologic diagnoses were retrieved for the study cases.

Different Thy categories of the Royal College System were defined as follows [8].

Nondiagnostic for cytologic diagnosis—Thy1

Adequate samples from solid thyroid nodules should consist minimally of 6 aggregates of follicular epithelial cells with at least 10 viable cells in each group. In this category, the report should include the reason of the smears being inadequate which in most of the cases is related to technical problems such as the presence of excess blood obscuring cellular details or colloid content or may be improper fixation.

Cystic nodules represent a challenge in the field of cytology. The main problem lies in the detection of cystic papillary carcinoma when cyst fluid is aspirated. For this case, it is important to separate smears with epithelial cellularity not fulfilling adequacy criteria, and those were formed mostly of macrophages without excess colloid, from those that are inadequate for technical problems as previously mentioned. These cases require proper evaluation by a multidisciplinary team in order not to miss malignancy. In these cases, the use of the term Thy1c, in which "c" denotes a cystic lesion, is advised by the Royal College System.

Nonneoplastic—Thy2

This category is described for samples fulfilling adequacy criteria and showing abundant colloid with bland looking follicular epithelial cells as the main components. The report should clarify the specific diagnosis such as hyperplastic nodule, thyroiditis with its specific subtype, or colloid nodule.

Cystic lesions that give samples with adequate content of follicular cells regardless of the amount of colloid, and also cases with abundant colloid even if the follicular cell content is short of adequacy limit, can be put under this category and reported as consistent with colloid cyst 'after correlation with clinico-radiologic findings'. These cases are given the code Thy2c.

Neoplasm Possible—Thy3

Follicular neoplasms represent the majority of this category, although hyperplastic and other cellular non-neoplastic lesions may be included. Neoplasms include follicular adenoma, follicular carcinoma, and also follicular variant of papillary carcinoma 'unclear nuclear features of papillary carcinoma'. Verification of the biologic behavior of a follicular neoplasm is not possible on cytological smears and multidisciplinary team discussion is mandatory for proper assessment and accordingly management decision. These cases are coded as Thy3f.

Within this category lie 'Thy3a' cases, and they represent the minor portion of this category. Possible morphologic criteria that necessitate inclusion of the case within this category include smears with mixed nearly equal micro and macro-follicular pattern of follicular cells (architectural atypia) with impossible verification of the neoplastic versus non-neoplastic nature of the nodule, samples with minimal colloid but no other features that can differentiate neoplastic from non-neoplastic lesions, smears with focal or obscured nuclear features of papillary thyroid carcinoma, and also samples showing excess blood obscuring cellular details. The cytological report of these cases should include the possible differential diagnosis according to morphologic criteria.

Suspicious for Malignancy—Thy4

Cases included in this category are those that show atypical cytomorphologic features but either not cellular enough or admixed with normal elements so that confident cytologic reporting of malignancy is not feasible. The exact type of the suspected malignancy should be stated in the cytology report.

Malignant—Thy5

This category includes different thyroid malignancies that can be diagnosed with confidence upon cytomorphologic basis. These include papillary carcinoma, medullary carcinoma, anaplastic carcinoma, lymphoma, and others. Cases that are definitely malignant but the malignancy can not be properly subtyped on cytologic smears should be put under this category.

Based on the clinical impact of cytological diagnosis, Thy3f, Thy4, and Thy5 usually undergo variable degrees of surgical treatment, while Thy1, Thy2, and Thy3a undergo different conservative (non surgical) management including patient release, follow-up, or repeated cytological aspiration.