



CRITERIA FOR CYTOLOGICAL DIAGNOSIS OF THYROID LESIONS

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Abstract:

Palpable thyroid nodules are more common in women, and male/female ratio ranged from 1.2 to 4.3.[1,3] Thyroid nodules may cause hypothyroidism, hyperthyroidism, cosmetic issues, and problems in other organs such as compression, and they also have the potential for malignancy. [4] Therefore, the accurate evaluation of thyroid nodules is crucial. In recent years, the role of fine-needle aspiration cytology (FNAC) is increasing regarding the management methods as well as its role in detection of malignancy potentials of thyroid nodules. No single diagnostic methods used for the definitive diagnosis of thyroid cancers, such as radiographs, US, scintigraphy and suppression therapy, is effective enough to make a benign/malignant differentiation alone.

FNAC has been used since the 1950s, and is one of the effective methods in the diagnosis of thyroid nodules.[5].In this article, a retrospective study of FNAC of thyroid lesions over a period of three years is analysed with reiew of literature.

Introduction:

FNAC is easy to apply, has a low complication rate and high diagnostic value and is a cost-effective test used in the diagnosis of thyroid nodules.[6,8,9] In addition to clinical information for diagnosis and treatment of thyroid lesions, US, scintigraphy, radiographic evaluation of the soft tissues of the neck and FNAC studies are essential. The use of FNAC resulted in a decrease in the number of patients who underwent surgical treatment by 25-50%, while increasing the percentage of malignant results in the operated group of patients.[10] Currently, FNAC is the preferred diagnostic method for the initial stage of evaluation of thyroid nodules[9]. Solitary thyroid nodules are unlikely to be malignant, which corresponds for 5% of these patients.[11,12] The Bethesda System for Reporting Thyroid Cytopathology group has identified six diagnostic categories in which the risk of malignancy increases respectively. These categories are reported as; benign: <1%, AUS/FLUS: 5-10%, FN: 20-30%, suspicious for malignancy: 50-75%, malignant: 100%.[13]. Three year retrospective study of FNAC of thyroid lesion in a tertiary care centre is presented here.

Materials and Methods:

Thyroid nodules measuring more than 1cm warrant further investigations. A complete clinical history was obtained, physical examination of the lesion and the draining lymph nodes was performed and laboratory investigations mainly included serum TSH levels.

Patients with elevated TSH levels underwent Ultrasound examination and patients with lowered levels of TSH (levels less than 0.1m IU/L) underwent radio-nuclide thyroid scan. In general, functioning thyroid nodules in the absence of significant clinical findings were excluded and FNAC was not attempted. Lesions with a maximum diameter 1.0 cm to 1.5 cm underwent FNA, unless they are simple cysts or septated cysts with no solid elements. 25-gauge needles were used to obtain adequate samples of the lesion. From June 2012 to May 2015, 60 cases of Fine needle aspiration cytology were studied and the results tabulated as per Bethesda system of reporting Thyroid cytopathology.

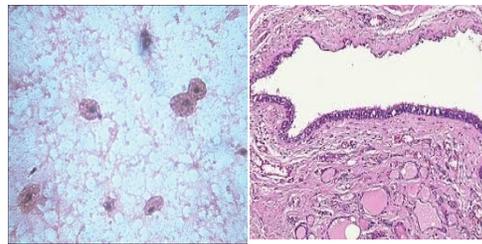


FIG.1 MICROSCOPIC PICTURE OF CYST FLUID. H&E X200 and corresponding Histopathology section showing thyroglossal cyst.

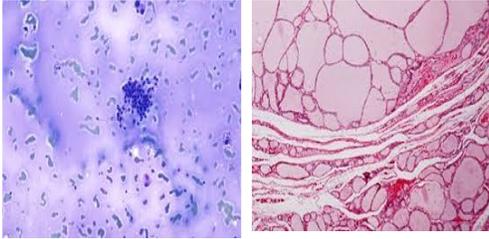


FIG 2 MICROSCOPIC PICTURE OF ADENOMATOID NODULE.H&EX100 and the corresponding Histopathology.

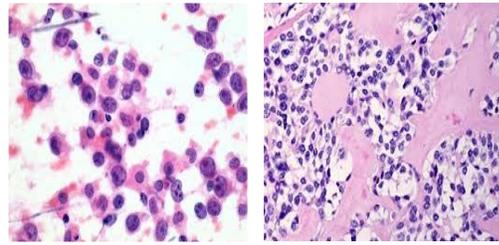


FIG.5 CYTOLOGY OF MEDULLARY CARCINOMA H&E X200 and corresponding histopathology

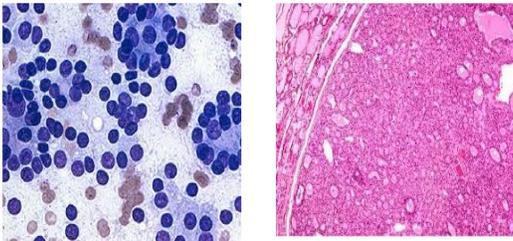


FIG.3.CYTOLOGY OF FOLLICULAR ADENOMA.H&EX200 and the corresponding histopathology.

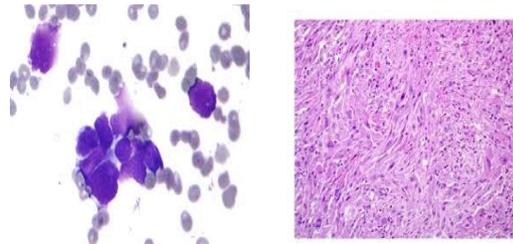


FIG.6 CYTOLOGY OF ANAPLASTIC CARCINOMA H&E X200 with corresponding histopathology.

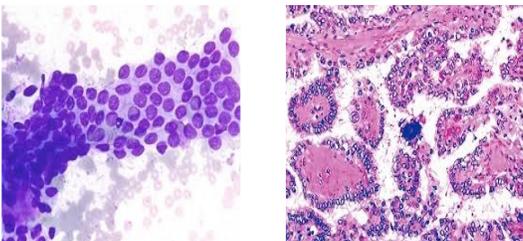


FIG.4 CYTOLOGY OF PAPILLARY CARCINOMA H&EX200 and the corresponding Histopathology.

Discussion and Review of Literature:

Indications for FNAC of thyroid lesions were varied. In October 2007, the National Cancer Institute (NCI) sponsored a conference to review the state of the science for the use of FNA in the management of thyroid nodules. The conference was preceded by a Web-based discussion among endocrinologists, surgeons, radiologists, and cytopathologists. Sono-graphically suspicious features put forward for nodule of size 1 cm included (1) microcalcifications; (2) hypoechoic, solid nodules; (3) nodules with irregular or lobulated margins; (4) intranodular vascularity; (5) a taller-than-wide shape; and (6) signs of spread beyond the capsule of the nodule. There is a lack of consensus on the smallest size nodule that could or should be biopsied; the American Association of Clinical Endocrinologists rely on ultrasound appearance rather than on nodule size, whereas the American Thyroid Association recommendation is to perform an FNA on nodules 1.0cm to 1.5 cm found to appear suspicious on ultrasound.

25-27gauge needles were used to obtain adequate samples of the lesion air-dried or alcohol-fixed by immersion in koplins jar for Haematoxylin and Eosin staining. 100% Isopropyl alcohol is used in our laboratory as fixative. Liquid-based cytology processing can be used either alone or as a supplement to direct smears.

Cell-rich liquid specimens can also be used for cell-block preparation. Between two and five passes appear to be a reasonable number to optimize the likelihood of obtaining adequate sampling of a solid or cystic nodule. Rapid staining and checking the adequacy is ideal but if unavailable, two to five passes in different directions and the evaluation of the smear is acceptable. Some authorities have recommended a minimum for cell counts (6 clusters of at least 10 follicular epithelial cells on 2 or more slides) to assure specimen adequacy.

Fine-needle aspiration biopsy is a blend of histopathology and cytopathology, and interpretation of the architectural configuration of the tissue fragments (pattern diagnosis), as much as cytomorphology of the component cells and isolated cells (exfoliative cytopathology) is an integral part of the evaluation. Mere pattern diagnosis or only cytomorphologic evaluation is inadequate. A sound knowledge of surgical pathology and expertise in cytopathology are essential.

A uniform reporting system for thyroid FNA will facilitate effective communication among cytopathologists, endocrinologists, surgeons, radiologists, and other health care providers; facilitate cytologic-histologic correlation for thyroid diseases; facilitate research into the epidemiology, molecular biology, pathology, and diagnosis of thyroid diseases, particularly neoplasia; and allow easy and reliable sharing of data from different laboratories for national and international collaborative studies. Hence, for clarity of communication, the Bethesda System for Reporting Thyroid Cytopathology is recommended.

The Bethesda System for Reporting Thyroid Cytopathology: Recommended Diagnostic Categories

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)

Category 1 - A repeated aspiration with ultrasound guidance is recommended for ND/UNS and clinically or sonographically worrisome Cyst Fluid Only (CFO) cases and is diagnostic in 50% to 88% of cases, but some nodules remain persistently ND/UNS. Excision is considered for persistently ND/UNS nodules because about 10% prove to be malignant.¹³ Unless specified as ND/UNS, the FNA specimen is considered adequate for evaluation.

Category II - The benefit of thyroid FNA derives in large part from the ability to make a reliably benign interpretation that avoids unnecessary surgery. Descriptive comments that follow are used to subclassify the benign interpretation. If resected, virtually all benign follicular nodules turn out to be nodules of a multinodular goiter or follicular adenomas. This distinction cannot be made by FNA and is of no consequence to the patient.

Category III - An effort should be made to use this category as a last resort and limit its use to approximately 7% or fewer of all thyroid FNAs. Some thyroid FNAs are not easily classified into the benign, suspicious, or malignant categories.

The recommended management is clinical correlation and a repeated FNA at an appropriate interval. In some cases, however, the physician may choose not to repeat the FNA but observe the nodule clinically or, alternatively, to refer the patient for surgery because of concerning clinical and/or sonographic features.

Category IV- The purpose of this diagnostic category is to identify a nodule that might be a follicular carcinoma (FC) and triage it for surgical lobectomy. Although the cytomorphic features do not permit distinction from a follicular adenoma (FA), they are reportable as “follicular neoplasm” (FN) or “suspicious for a follicular neoplasm” (SFN), leading to a definitive diagnostic procedure, usually lobectomy. About 15% to 30% of cases called FN/SFN prove to be malignant. (14,15,16) The majority of FN/SFN cases turn out to be FAs or adenomatoid nodules of multinodular goiter, both of which are more common than FC.

Category V - Nodules called suspicious for papillary carcinoma are resected by lobectomy or thyroidectomy. Most (60%-75%) prove to be papillary carcinomas, and the rest are usually FAs. The same general principle applies to other thyroid malignancies like medullary carcinoma and lymphoma, but these are encountered less frequently than PTC. Ancillary testing (eg, immunohistochemical analysis, flow cytometry) in borderline cases is usually more helpful with medullary carcinoma and lymphoma than with PTC.

Conclusion:

Given these facts, cytopathologists should accept that the holy grail of thyroid FNA should not necessarily be the elimination of all false-negative cases. Laboratories should carefully monitor the results of their thyroid FNA program. Overall diagnostic rates as well as correlation with follow-up surgical excisions provide valuable information. Rates of malignant outcomes in the various FNA diagnostic categories can be compared with published benchmarks. All of these can and should be used to evaluate the laboratories as well as the performance of individual cytopathologists.

BETHESDA CATEGORY	AGE RANGE OF PATIENTS TESTED	NO.OF CASES IN EACH BETHESDA CATEGORY.	SEX INCIDENCE M=Male. F=Female.
CATEGORY 1	20 -40 yrs	09	M =4,F=5
CATEGORY 2	20-40 yrs	10	M=4,F=6
CATEGORY 3	20 –40 yrs	09	M=6,F=3
CATEGORY 4	5 pts bet. 20-40yrs 5 pts bet.40-60yrs	10	M=5,F=5
CATEGORY 5	4 pts bet.20-40yrs 5pts bet.40-60yrs	09	M=4,F=5
CATEGORY 6	3 pts bet.10-20 yrs 4 pts bet.20-40yrs 5 pts bet.50-60yrs	12	M=3,F=9

TABLE 1: JUNE 2012 TO MAY 2015 (TOTAL NO. OF CASES 60)

CYST FLUID	3
ACELLULAR SPECIMEN	4
HAEMORRHAGIC SMEAR	2

TABLE 2: JUNE 2012 TO MAY 2015 MAY(TOTAL NO. OF CASES IN CATEGORY I = 9)

BENIGN FOLLICULAR NODULE	4
LYMPHOCYTIC(HASHIMOTOS) THYROIDITIS	5
GRANULOMATOUS (SUBACUTE) THYROIDITIS	1

TABLE 3: JUNE 2012 TO MAY 2015 TOTAL NO. OF CASES IN CATEGORY II = 10

SUSPICIOUS FOR PAPILLARY CARCINOMA	8
SUSPICIOUS FOR MEDULLARY CARCINOMA	6
SUSPICIOUS FOR METASTATIC CARCINOMA	1
SUSPICIOUS FOR LYMPHOMA	1

TABLE 4: 2012 MAY TO 2015 MAY(TOTAL NO. OF CASES IN CATEGORY V = 16

PAPILLARY THYROID CARCINOMA	06
MEDULLARY THYROID CARCINOMA	03
UNDIFFERENTIATED (ANAPLASTIC) CARCINOMA	02
POORLY DIFFERENTIATED CARCI- NOMA	01
SQUAMOUS CELL CARCINOMA	00
CARCINOMA WITH MIXED FEA- TURES	00

TABLE 5: 2012 MAY TO 2015 MAY TOTAL NO. OF CASES IN CATEGORY VI - 12

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