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Utility of fine needle aspiration cytology on thyroid lesions

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Abstract
Introduction: Fine needle aspiration cytology (FNAC) is slightly invasive, cost effective and gold standard for thyroid nodule diagnosis.
Aim: The aim of the study is to correlate the pre-operative and post-operative findings of FNAC with histopathology and detect pitfills of FNAC.
Materials and methods: The study is retrospective and consists of about 100 cases which were recruited from department of pathology, GEMS & Hospital for a period of September 2017 to February 2019. The available cases from department were considered for the study. Fine needle aspiration results were compared with histological diagnosis.
Observation and results: FNAC diagnosis showed benign lesions in 86 patients, malignant in 14 patients and histopathological findings exhibited benign in 88 and malignant in 7 cases. Sensitivity, specificity and accuracy of the study to diagnose malignant lesions were calculated and are 75%, 98% and 98.3% respectively.
Conclusion: FNAC has evolved as most accurate, sensitive and specific tool for screening of thyroid patients initially and hence minimized the takeover of un-necessary surgeries. However, histopathological diagnosis remains to be confirmatory.

Keywords: FNAC, thyroid, histopathology, serology

Introduction
Thyroid gland is one of the important endocrine organ that play a vital role in human body. The hormones of thyroid gland affect all parts of the body and are responsible for maintenance of homeostasis and integrity. Thyroid nodular lesions are most common clinical problem in women especially in case of iodine deficiency. It is noted that an estimated 4-5% population are apparent to thyroid swellings [1]. The incidence of thyroid cancer in this population is approximately 0.1% in general population and 20% in surgically biopsied population [2]. Exposures to radiations in childhood pose an increased risk of developing thyroid nodule and carcinoma. True solitary thyroid nodules (STN) occur in 4 to 7% of adult population. Most of the nodules remain asymptomatic [3]. Currently, many investigations including diagnostic imaging studies, serologic and cytogenetic tests as well as histopathological techniques are available to evaluate STN. In this study, the commonly used tests like Fine needle aspiration cytology and histopathology were assessed for best diagnostic strategy.
Fine needle aspiration cytology is novel, cost effective, first line diagnostic test which is relatively accurate with low turn-around time (TAT). It is considered as safe and widely recommended diagnostic modality. Though it is very useful, the major pit fill of this procedure is that it cannot differentiate follicular adenoma from follicular carcinoma [4].
Histopathology of the thyroid tissue is the Gold standard diagnostic modality for detecting solitary thyroid lesions. The surgical excision of nodule and histopathological examination of it is the only way to differentiate follicular adenoma from follicular carcinoma. However, the accuracy of the diagnostic tools is to be found out in order to understand its drawbacks. Hence, the aim of the study is designed to compare the effective diagnostic tools used for thyroid lesions.

Materials and Methods
The study is being performed in GEMS & Hospital, Srikakulam for a period of 1 year six months from September 2017 to February 2019. The study was retrospective, the materials/

specimens used were both cytological and histological specimens. Recurrent malignancies and anaplastic carcinomas were excluded from the study. Informed patient consent was taken prior to FNAC procedure. Briefly, the site was sterilized with spirit swab, followed by aspiration from various locations of lesion with the help of 22 gauge needle and 10cc disposable syringe. A glass side is used for making a smear which is then fixed with methanol for a time limit of 20 minutes for subsequent pap staining. Another smear is left air dried to be used for Giemsa stain. Slides were labelled and an addition of two more slides was reserved for special staining procedures. Wet smear was made with Haematoxylin-Eosin and Pap stain. Air dried smears were also stained with MGG stain and slides were mounted with Dibutyl phthalate Polystyrene Xylene (DPX). The patients who require surgery after thorough clinical evaluation were taken up for thyroidectomy procedure and specimens were evaluated for histopatholical examinations. Specimens were processed in automated tissue processing unit and staining was performed by haematoxylin-Eosin stain.

Results

In our study, females outnumbered males (Females-85: males-15). The age group ranged from 04 - 65 years. All the cases diagnosed as Thyroglossal cysts are children. The maximum numbers of patients were between 30-55 years. Cytological investigations revealed benign lesions in 88 patients, intermediate in 5 and malignant in 7 patients. Histopathological diagnosis exhibited benign lesion in 86 patients and malignant in 14 patients.

Table 1: The Histopathological and Cytological Diagnosis

Diagnosis	Histopathological diagnosis	Cytological diagnosis
Simple colloid goiter	20	18
Goiter with cystic change	18	25
Benign follicular lesion of thyroid*	50	48
Auto immune thyroiditis	-	05
Thyroglossal cyst	05	05
Granulomatous thyroiditis	-	02

*On histopathological examination, benign follicular lesion include 19 nodular goiter, 20 adenomatous hyperplasia and 11 follicular adenoma.

Table 2: The Histopathological and Cytological observations

Diagnosis	Histopathological observations	Cytological observations
Papillary carcinoma	5	11
Follicular carcinoma	5	-
Follicular variant ofPapillary carcinoma of thyroid	6	-
Anaplastic insular cell carcinoma	1	1

An indeterminate lesion includes Follicular neoplasm 12, Suspicious for malignancy 4, hemorrhagic aspirate or inadequate sample 3.

True positive = 15, true negative = 93, False positive = 2, False negative = 2.

Sensitivity = True positive / True positive + False negative X 100

Specificity = True negative / True negative + False positive x 100

Accuracy = (True positive + True negative)/ (True positive + False positive + True negative + False negative) x 100.

Sensitivity = 18/18+6 X 100% = 75%
Specificity = 98/ 98+2 X 100%= 98%
Accuracy = 119/119+2 X 100% = 98.3%

Discussion

Thyroid cytopathology reporting requires clear communication between pathologists, endocrinologists, radiologists and surgeons. Hence, consistent diagnostic terminology is of utmost importance. Based on the available scientific literature, FNAC proved to be an excellent diagnostic tool for the management and diagnosis of thyroid lesions. FNAC became the gold standard approach for thyroid swellings. Accuracy of this approach is 95% in the differentiation of lesions. In our study, maximum age groups were between 30-55 years and female: male ratio was 5:8:1. In this study, false positive cases were 2 which includes papillary carcinomas. Histopathological analysis confirmed them as Adenomatoid Hyperplasia in nodular goitre of thyroid [5, 6].

Table 3: Cytological and Histopathological diagnosis

Cytological diagnosis	Histopathological diagnosis
Colloid goiter with cystic change	Papillary micro-carcinoma
Lymphocytic thyroiditis	Low grade NHL with areas of Hashimoto's thyroiditis
Beningn follicular lesion	Papillary carcinoma - follicular variant
Nodular goiter with oncocytic metaplasia	Hurtle cell tumor

In our study, age of patients ranged from 04 to 65 years with mean of age 35.2 years. In a study from Saudi Arabia, the mean age was 36.17 years which is consistent with our study. In a literature survey, it is clearly noted that size of the nodule is only a weak predictor of histological malignancy. Overall sensitivity of thyroid scan by Ultrasonography was 80% with 20% specificity. In coordination with our study, it was reported that sensitivity is 75%. This proves that thyroid Ultrasonography is more sensitive than specific in detecting malignancy of thyroid.

FNAC is a sensitive and highly specific method of evaluating thyroid nodules for malignancy [7, 8, 9]. In comparison with our results of FNAC with histopathology, overall sensitivity of FNAC was found to be 75%, specificity 98% and accuracy was 98.3%. Our results are in concordance with other similar studies. In a review on FNAC for detecting thyroid nodule, it was also reported that sensitivity was 65-98% and specificity was 72-100% [10]. Another study reported that, FNAC is more specific in thyroid detection than other techniques and is used as a reliable diagnostic test. Ultrasound guided FNAC results in better sample acquisition, which results in better diagnostic accuracy. FNAC should be advised for every patient since it is an inexpensive, sensitive, specific and accurate method and widely accepted as an initial investigation of choice for thyroid diseases in all tertiary care hospitals.

Conclusion

Fine needle aspiration cytology is more specific technique than sensitive whereas histopathology is more sensitive than specific in detecting malignancy of thyroid. Therefore, fine needle aspiration cytology is highly accurate and better than thyroid ultrasound in evaluating thyroid nodule. Hence, it can be considered as best suited investigation modality for thyroid lesions in all tertiary care hospitals.

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