

ORIGINAL ARTICLE

Importance of fine needle aspiration cytology with ultrasound (US FNAC) in thyroid lesions

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ABSTRACT

Introduction: Thyroid nodular (TN) lesions are a common clinical problem in the world. These are more common in women and in areas of iodine deficiency. A solitary thyroid nodule is a palpable swelling in thyroid gland that has otherwise a normal appearance. A variety of tests have been employed to separate benign from malignant thyroid nodules. Thyroid fine needle aspiration cytology (FNAC) is over 50 years old and is the principle method of preoperative diagnosis in both children and adults. **Materials and Methods:** Total of 100 cases was evaluated retrospectively. A cytological diagnosis was made as per Bethesda classification. According to the Bethesda 2007 classification results were categorized as benign, atypia of undetermined significance (AUS)/follicular lesion of undetermined significance (FLUS), follicular neoplasm (FN)/ suspicious for follicular neoplasm (SFN), suspicious for malignancy, and malignant ones. Benign lesions were further categorized in to colloid nodules, multinodular goitre, toxic goitre and lymphocytic thyroiditis. **Results:** Out of 100 patients, 75 were females (75%) and 25 were males (25%). The mean age was 44.3 ± 15.9 with age range of 20-80 years. The mean age of male patients was greater than the mean age of female patients (52.1 ± 16.2). Benign 70/51 (70%) cases were further categorized as per FNA findings and were correlated with clinical details, hormonal profile and imaging studies. Four cases (5.71%) out of 70 benign cases showed disturbed serum thyroid profile (raised serum T3, T4 levels and reduced TSH levels) along with consistent findings on FNA smears. FNAC in 18 (25.71%) cases with diffuse thyroid lesions revealed lymphocytic infiltrate destroying the follicular sheets, hence diagnosed as lymphocytic thyroiditis. 9 cases showed FNA findings consistent with clinical as well as radiological findings, and were diagnosed as multinodular goitre. **Conclusion:** The results of our study are comparable with the current published data and demonstrate that FNA cytology is a sensitive, specific, and accurate initial diagnostic test for the preoperative evaluation of patients with thyroid swellings in our setting as well. FNAC still plays an important role in the diagnosis of the thyroid lesions. If reported as Bethesda system, lesions can be further categorized and treatment plan can be done without any delay. **Keywords:** Thyroid nodular (TN) lesions, iodine deficiency, fine needle aspiration cytology.

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INTRODUCTION

Thyroid nodular (TN) lesions are a common clinical problem in the world. These are more common in women and in areas of iodine deficiency. Exposure to ionizing radiation in childhood and adolescence increases the risk of solitary thyroid nodule and thyroid carcinoma. In the United States, 4 to 7% of the adult population has a palpable thyroid nodule.¹ A solitary thyroid nodule is a palpable swelling in thyroid gland that has otherwise a normal appearance.² A variety of tests have been employed to separate benign from malignant thyroid nodules.³

Thyroid fine needle aspiration cytology (FNAC) is over 50 year's old⁴ and is the principle method of preoperative diagnosis in both children and adults. It has been shown to be superior to clinical, radionucleotide or thyroid ultrasound assessment alone.

FNAC has now supplanted most other tests for preoperative evaluation of thyroid nodules. FNAC requires careful aspiration technique and interpretation of the cytological findings. Most practitioners rely on FNAC alone, especially for the first attempt at diagnosis. Due to its simplicity, low cost and absence of major complications, this procedure is being performed on an increasing number of patients, which has led to the detection of thyroid cancers at earlier stage, resulting in better outcome of patients. The routine use of FNAC in the assessment of thyroid nodules has reduced the number of patients subjected to thyroidectomy for benign diseases of the thyroid.⁵ As a result, the incidence of malignancy at thyroidectomy has increased from 5-10% to 30-50% in the recent years.⁶ This has assumed a dominant role in determining the management of patients with thyroid

nodules.^{7,8} Nevertheless, like any other test FNAC has its limitations. The reported pitfalls are those related to specimen adequacy, sampling techniques, the skill of the physician performing the aspiration, the experience of the pathologist interpreting the aspirate, and overlapping cytological features between benign and malignant follicular neoplasm.^{9,10} The diagnostic dilemma arises as only 5% of thyroid nodules represent cancer.¹¹ Clinically difficult to distinguish between the various presentations, Fine Needle Aspiration Cytology (FNAC) gives the physician an approach towards its treatment. FNAC of the thyroid gland is a first line tool to evaluate thyroid lesions – both diffuse, and nodular. The result is useful in confirming the benignity of the lesion; thereby reducing unnecessary surgery.¹² The present study was undertaken to evaluate the results of thyroid FNAC, its correlation with histology, to highlight its limitations and diagnostic pitfalls as well as the impact of FNAC on the decreased rate of surgery in clinically suspect thyroid lesions.

MATERIAL AND METHODS

Total of 100 cases were evaluated retrospectively. A cytological diagnosis was made as per Bethesda classification.¹³ According to the Bethesda 2007 classification results were categorized as benign, atypia of undetermined significance (AUS)/follicular lesion of undetermined significance (FLUS), follicular neoplasm (FN)/ suspicious for follicular neoplasm (SFN), suspicious for malignancy, and malignant ones. Benign lesions were further categorized in to colloid nodules, multinodular goitre, toxic goitre and lymphocytic thyroiditis. Comparing the results of cytologic and

histopathologic examinations, the sensitivity, specificity, positive and negative predictive value, and accuracy were calculated. These values were calculated by the following formulas. Patients with nondiagnostic FNAC were excluded from the calculations. US-FNAC was done by two dedicated radiologists. FNAC was performed under US guidance from the most suspicious thyroid nodule. US-FNAC was performed using a 24-gauge needle with a 10 ml syringe, either by capillary, aspiration, or mixed sampling technique depending on the nodule and radiologist preference. The samples were prepared on glass slides and immediately fixed in 95% alcohol for Papanicolaou staining. Local anesthesia was occasionally used. The smears were assessed for adequacy by the onsite technician. If the sample was inadequate, the FNAC was repeated. In vascular lesions the cell block was selectively sent. These samples were reported by a single dedicated cytopathologist.

All statistical calculations were performed using IBM SPSS Statistics (IBM SPSS Statistics for Windows, Version 19.0, Company ©1989-2010, SPSS Inc. an IBM Company) program.

RESULTS

Out of 100 patients, 75 were females (75%) and 25 were males (25%). The mean age was 44.3±15.9 with age range of 20-80 years. The mean age of male patients was greater than the mean age of female patients (52.1±16.2). The cytological diagnosis made as per Bethesda system was further distributed with gender and mean age.

Table 1: Distribution of cases as per diagnosis on FNAC with gender and mean age of the patients

	Total cases	M:F ratio	Mean age ± SD (M)	Mean age ± SD (F)	Percentage
Benign	70	1:3	54.1,14.3	38.5, 12.1	70%
AUS,FLUS	3	-	Nil	48.7	3%
FN, SFN	15	-	Nil	30, 12.6	15%
Suspicious for Malignancy	2	-	Nil	80	2%
Malignancy	6	-	59,4.7	Nil	6%
Non diagnostic	4	-	Nil	37	4%

Benign 70/51 (70%) cases were further categorized as per FNA findings and were correlated with clinical details, hormonal profile and imaging studies. Four cases (5.71%) out of 70 benign cases showed disturbed serum thyroid profile (raised serum T3, T4 levels and reduced TSH levels) along with consistent findings on FNA smears. FNAC in 18 (25.71%) cases with diffuse thyroid lesions revealed lymphocytic infiltrate destroying the follicular sheets, hence diagnosed as lymphocytic thyroiditis. 9 cases showed FNA findings

consistent with clinical as well as radiological findings, and were diagnosed as multinodular goitre.

DISCUSSION

FNAC was first proposed in 1904 to sample lymph node in sleeping sickness. In 1930 Martin & Ellis described it as a valuable step in the workup of neck lumps included in thyroid nodule.¹⁴ Fine Needle Aspiration Cytology (FNAC) Thyroid disorders are varied in their presentations and characteristics. An

established first line of investigation for any evident thyroid swelling is a 'Fine Needle Aspiration Cytology (FNAC) after a thyroid function test.^{15,16} It has gained popularity based on the facts that it is easy to perform, quick, has a high degree of sensitivity and specificity and is less painful. Cytological categorization of thyroid lesions into benign and malignant is very helpful to clinicians in the management of patients with specific reference to the need of thyroid surgery, as most of the benign conditions can be managed medically. It is useful to remind that there are different classification systems for thyroid FNA reporting. Systems range from three to six or more diagnostic categories. The system currently and most commonly used (Bethesda System) contain six categories as follows: benign, lesion (atypia) of undetermined significance, follicular neoplasm, suspicious for malignancy, malignant, and nondiagnostic. The Bethesda System for Reporting thyroid Cyto-pathology group has recognized six diagnostic categories in which the risk of malignancy increases respectively. These categories are benign with <1%, AUS/FLUS with 5-10%, FN with 20-30%, suspicious for malignancy with 50-75% and malignant with 100% malignant potential.¹⁷ It was noticed that the percentage of malignant cases has been increased in the operated group of patients due to this type of reporting.¹⁸ But the thyroid lesions presenting a solitary thyroid nodules are less likely to be malignant so FNA played an important role in the initial step of management and helps in the early diagnosis.^{17,19} In the current study thyroid lesions were found more common in females with lesser mean age at presentation than males.²⁰⁻²² The studies done in the past emphasized that most of the thyroid lesions are of benign nature. As maximum numbers of lesions were found to be benign (76.4%) in the current study, these findings were in concordance.²³ It is mentioned in the literature that FNAC of the thyroid has resulted in a decreased number of surgeries by 25-50%. In our experience also 23.0% cases of the benign thyroid lesions diagnosed on FNA were managed by non-surgical methods only.¹⁷ The diagnosis of "AUS/FLUS," "FN/SFN" and "suspicious for malignancy" are accounted for 12.1% in one study and in the current study this diagnosis was made in 18% of the cases.²⁴⁻²⁶ The diagnosis of "suspicious for malignancy," "AUS/FLUS" and "FNS" represents a large proportion of cases in thyroid lesions so in addition to FNAC other molecular techniques should be done to reach at accurate diagnosis.²⁶⁻²⁸

CONCLUSION

The results of our study are comparable with the current published data and demonstrate that FNA cytology is a sensitive, specific, and accurate initial diagnostic test for the preoperative evaluation of patients with thyroid swellings in our setting as well. It was concluded from

that FNAC still plays an important role in the diagnosis of the thyroid lesions. If reported as Bethesda system, lesions can be further categorized and treatment plan can be done without any delay.

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