

Cytoradiological Analysis of Thyroid Lesions: A Clinical Study

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Abstract

Introduction: Thyroid nodules are common in the general population. Managing patients with thyroid nodules can be challenging. Patients harboring malignancies require surgical intervention which is challenged by anesthesia, size, age, etc., and therefore an accurate preoperative diagnosis is paramount. Hence, FNA was introduced as an effective means to evaluate the thyroid nodule.

Materials and Methods: Hundred patients attending the thyroid clinic at INMAS hospital were included in the study. The medical records of these cases were reviewed to identify the demographics of the patients and the indication for FNA. Thyroid status and complete blood counts were also obtained in addition to the ultrasound findings.

Results: There were 92 females and 8 males with an age range of 5-80 yr. Indications for FNA included abnormal neck physical examination, abnormal radiographic findings, and symptoms of thyrotoxicosis or compression. Of the 100 FNAs, 6 had a cytologic diagnosis of carcinoma (with 2 papillary carcinoma), 5 "suspicious" for carcinoma, neoplasm, or atypia, 81 were benign with a diagnosis of colloid goiter, nodular colloid goiter and cystic change in colloid goiter, 7 had lymphocytic thyroiditis and 2 had granulomatous inflammation.

Conclusion: The performance characteristics, low cost, and low complication rate support the use of FNA as a screening tool to identify these malignancies. However, the combination of various diagnostic modalities, instead of a single modality, will give optimal results and better patient management.

Key words: Analysis, Thyroid, Lesions

INTRODUCTION

Thyroid nodules are common in the general population. The estimated prevalence of thyroid nodularity have been demonstrated in autopsy studies to be 19–35%.^{1,2} Of these nodules, less than 5-10% are malignant.² Hence the incidence of malignancy is quite low compared to the overall incidence of thyroid lesions. So, the goal of the diagnostic work up is to select patients those who are more likely to harbor malignancy. The thyroid gland is the largest endocrine gland. Its superficial location allows its

evaluation by physical examination, ultrasonography and fine needle aspiration.

Fine-needle aspiration (FNA) is an important diagnostic tool for the evaluation of thyroid lesions because of its low cost, ability to prevent unnecessary surgery in cases with benign diseases, and ability to accurately characterize malignant lesions hence guiding therapy.

Studies have shown diagnostic accuracy of thyroid FNA to be about 95%; additionally, FNA has been shown to perform better than ultrasonography and radionuclide scans in terms of sensitivity, specificity, and positive and negative predictive values.^{3,4} However, the diagnostic utility of FNA is highly dependent on the expertise of the cytopathologist.

Our objective is to evaluate the cytoradiologic findings of thyroid lesions in the patient population attending the INMAS hospital.

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MATERIALS AND METHODS

Hundred patients attending the thyroid clinic at INMAS hospital were included in the study. The medical records of these cases were reviewed to identify the demographics of the patients and the indication for FNA. Thyroid status and complete blood counts were also obtained in addition to the ultrasound findings.

RESULTS

There were 92 females and 8 males with an age range of 5-80 yr. Indications for FNA included abnormal neck physical examination, abnormal radiographic findings, and symptoms of thyrotoxicosis or compression. The results are summarized in Tables 1-3.

Of the 100 FNAs, 6 had a cytologic diagnosis of carcinoma (with 2 papillary carcinoma), 5 “suspicious” for carcinoma, neoplasm, or atypia, 81 were benign with a diagnosis of colloid goiter, nodular colloid goiter and cystic change in colloid goiter, 7 had lymphocytic thyroiditis and 2 had granulomatous inflammation.

Colloid adenomatoid nodules were characterized by cellular smears with clusters of uniform follicular cells in a background of abundant colloid, often thin and watery. Focal Hurthle cell change, as well as the presence of pigment-laden macrophages and multinucleated histiocytes, was evident. Papillary thyroid carcinoma showed cellular smears with scanty background colloid. A few cases showed well-formed papillary fragments of neoplastic epithelium with fibrovascular cores. However, more common was

the presence of small tissue fragments in a monolayered sheet-like architecture. Higher magnification revealed characteristic intranuclear inclusions, occasional nuclear grooves, and fine dusty chromatin. Follicular neoplasms were characterized by cellular smears with abundant proliferation of neoplastic epithelium in prominent microfollicular architecture. Characteristic nuclear features of a papillary carcinoma were absent. The microfollicles tended to be approximately of the same size.

In Benign lesions the cytoradiological correlation was accurate. The USG findings were regular margins, perilesional vascularity, with or without cystic degeneration and no significant lymphadenopathy.

In case of follicular carcinoma irregular margins and central and perilesional vascularity were reported with a single case showing lymphadenopathy.

However a case of papillary carcinoma was missed on radiological evaluation. In addition borderline lesions radiological findings were non contributory.

Taking a cut off of Hb level of 12 and 13 g/dl respectively for females and males, anemia was found in 29 females and 1 male. WBC counts and platelets were within normal limits.

DISCUSSION

In the general population, thyroid nodules are quite common, but the vast majority of these nodules are benign. Managing patients with thyroid nodules can be challenging. Patients harboring malignancies require surgical intervention which is challenged by anesthesia, size, age, etc., and therefore an accurate preoperative diagnosis is paramount. Hence, FNA was introduced as an effective means to evaluate the thyroid nodule. FNA is a cornerstone in evaluation of solitary thyroid nodules. It is the preoperative screening method of choice as it distinguishes benign from malignant quite effectively. In the hands of expert cytologists the accuracy is 98%. The diagnosis is correct in 90% of anaplastic and medullary carcinoma. However, in case of follicular carcinoma, the accuracy is about 40% as FNAC fails to distinguish between benign and malignant lesions due to overlapping features.⁵

Studies report excellent performance parameters for FNA, with some showing FNA outperforming ultrasonography and radionucleotide scans.⁶⁻⁸

Corrias *et al.* evaluated and compared the diagnostic accuracies of various modalities such as clinical, laboratory,

Table 1: Demographics

State	Number of patients
Delhi	66
Haryana	13
Uttar Pradesh	09
Others	12

Table 2: Presenting symptoms

Nodularity	Number of patients
Solitary nodule	63
Multinodular goitre	23
Diffuse goitre	14

Table 3: Hormone status

Thyroid profile	Number of patients
Euthyroid	58
Hypothyroid	18
hyperthyroid	24

and imaging data collected retrospectively in a group of pediatric patients with thyroid nodules submitted for FNA.⁴ They looked at (1) symptoms of neck compression (2) cervical adenopathy (3) thyroid function, calcitonin level, and antithyroid antibody titers (4) ultrasonography (5) ^{99m}Tc scintiscanning, and (6) cytology obtained with FNA. The patients were divided into two groups, those with benign and malignant lesions. Patients and nodule characteristics were analyzed statistically to determine their strength of association with the presence of thyroid cancer. Among clinical findings, only cervical adenopathy was significantly higher in the cancer group ($P < 0.006$). Thyroid function and antibody titers were similar in the two groups, whereas the serum calcitonin level was elevated in only one patient with a malignant lesion. Among ultrasonography findings, no significant statistical difference was found between the two groups regarding number, size, growth progression, or hypoechogenic characteristics of the nodules. Regarding scintigraphic findings, no significant difference was found between the two groups. However, a positive correlation ($P < 0.0001$) was found between FNAC findings and histologic diagnoses. Based on a multiple regression analysis, the study concluded that only FNA significantly contributed in detecting thyroid malignancy in childhood and adolescence, offering the best sensitivity, specificity, and accuracy in detecting malignancy compared with conventional approaches.

Limitations of the FNA include the physician's expertise, which affects sampling, and the expertise of the cytopathologist interpreting the specimen. Both may affect the number of false-positives and false-negatives. Additionally, difficulties include interpreting follicular lesions (benign vs malignant), Hurthle cell lesions and lymphocytic lesions (lymphocytic thyroiditis vs lymphoma).⁹

Unsatisfactory FNAs often lead to repeat procedures and may force surgical intervention or a delay in diagnosis. The presence of atypical cells may reflect an underlying malignancy, but may also subject the patient to unnecessary surgical intervention.

Features suggestive of malignancy on ultrasonographic evaluation include hypoechoic pattern, incomplete peripheral halo, irregular margins, internal microcalcification and presence of cervical lymphadenopathy.¹⁰⁻¹²

Features pointing to benign disease include variable echogenicity, multinodularity, large cystic lesion and

perilesional vascularity. In our study In Benign lesions the cytoradiological correlation was accurate. The USG findings were regular margins, perilesional vascularity, with or without cystic degeneration and no significant lymphadenopathy.¹⁰⁻¹²

In case of follicular carcinoma irregular margins and central and perilesional vascularity were reported with a single case showing lymphadenopathy.

However a case of papillary carcinoma was missed on radiological evaluation. In addition borderline lesions radiological findings were non contributory.

CONCLUSION

The performance characteristics, low cost, and low complication rate support the use of FNA as a screening tool to identify these malignancies. However, the combination of various diagnostic modalities, instead of a single modality, will give optimal results and better patient management.

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