Research Article

Cytology findings of the thyroid lesions with the histopathology findings correlation

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Abstract

Background: The gold standard in the detection of thyroid swellings is fine needle aspiration cytology (FNAC), particularly to eliminate the necessity of surgery.

Objective: (1) To introduce FNAC as a routine diagnostic procedure in surgery; (2) to study the correlation between histopathology and cytology findings of thyroid gland lesions; and (3) to assess the diagnostic accuracy of FNAC in thyroid nodules.

Materials and Methods: This is a prospective study conducted in 485 patients from May 2011 to October 2013, who visited to the Pathology Department of our hospital. Of the total 485 patients who were subjected to FNAC, 60 patients were operated and the samples sent for histopathological examination. Only those cases that underwent FNAC and biopsy were selected for this study.

Result: The histopathology findings of thyroid lesions in 60 patients, comprising six male subjects (10%) and 54 female subjects (90%; age range, 6–80 years; median, 43 years), were reviewed. The FNAC showed a sensitivity of 87.5%; specificity, 96.15%; positive predictive value, 77.77%; negative predictive value, 98.03%; and diagnostic accuracy, 95%. The efficacy of FNAC was quite reliable.

Conclusion: The results are comparable with the current published data and demonstrate that FNA cytology examination in our hands is an accurate investigation for further management of thyroid lesions.

KEYWORDS: FNAC, thyroid lesions, cytology, histopathology

Introduction

Fine needle aspiration cytology (FNAC) is a well-known safe diagnostic procedure. FNAC is the study of cells collected by a fine needle under vacuum. This procedure has an advantage of being simple, safe, speedy, minimally invasive and cost effective. FNAC forms a valued assistant to the pre-operative examination in the detection of thyroid nodules, and in majority of the cases, it can differentiate neoplastic from nonneoplastic lesions.[1] The ease and simplicity of the procedure and the diagnostic accuracy comparable with other invasive procedures have contributed greatly to the wide application of FNAC by most clinicians.[2] This technique has been successfully utilized in the diagnosis of many pathological lesions in multiple organs including lung, lymph nodes, bone, thyroid, salivary gland, soft tissue, and other anatomic regions such as head and neck, thorax, abdomen, and pelvis.[3,4] FNAC is a priceless, fast, practically noninvasive, and simple investigative procedure, the significance and applicability of which

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the clinicians and pathologists globally in recent time have progressively appreciated.[5]

Regarding the efficacy of FNAC, Stewart's statement regarding the aspiration biopsy is as appropriate as it was in 1933: "Diagnosis by aspiration is as reliable as the combined intelligence of the clinician and pathologist makes it."[6]

Considering the aforementioned importance of FNAC in modern cytological techniques, this work was undertaken to evaluate the FNAC of thyroid swellings from the patients approaching our institute in various surgical wards, and aspiration was done to perform the cytological diagnosis and postoperative histopathological correlation during the period from May 2011 to October 2013.

Materials and Methods

This prospective study was undertaken to study the cytology findings of palpable thyroid lesions and compare them with histology findings wherever possible to determine its diagnostic accuracy. All the patients referred to FNAC of thyroid lesions were studied prospectively for a period of 2 years from May 2011 to October 2013 in the Department of Pathology, Government Medical College, Surat, Gujarat, India. All the patients were clinically examined in detail, and a careful palpation of the thyroid was done to guide precisely the location for doing aspiration. The details of the procedure were explained to the patients and written consent of patients taken. Aspiration was done with the patient lying comfortably in a supine position, and neck was extended with a pillow under the shoulder so as to make the thyroid swelling appear prominent. Under aseptic precautions, 23-gauge needle was inserted into the lesion without attachment of a syringe and to and fro movement performed quickly. The material gets collected in the bore by capillary suction. The needle hub was attached to air-filled syringe, and the plunger was pushed down to expel the material onto a clean, labeled glass slide. Several smears were made in each case. Some samples were fixed in 95% ethyl alcohol and stained by routine hematoxylin and eosin (H&E) method and Pap smear method; other samples were air dried and stained with MGG stain.

During the period of this study from May 2011 to October 2013, a total of 485 FNAC done from thyroid; among them, 60 samples were biopsied subsequently and subjected to histopathological study. Only those cases with histopathological correlation were selected for this study. All the 60 patients were treated by surgeries such as total, subtotal, and hemithyroidectomies. Specimens for histopathological examinations were received in Pathology Department. All the specimens were fixed in 10% formalin. Detailed gross examination was done, and 4–10 tissue bits were selected from representative area for routine paraffin sections, which were stained by H&E method. Correlation of cytological and histopathological findings was performed. Sensitivity, specificity, accuracy, positive predictive value, and negative predictive value were calculated for neoplastic and carcinomatous lesions by using the methodology of Galen and Gambino.

Results

A total of 60 cases were evaluated by cytology and histopathology examinations, which came to our Pathology Department. The majority of cases were female subjects, and female:male ratio was 9:1 [Table 1].

As shown in Figure 1, most of the cases were presented in the 31–50 years age group. Malignant lesions were found most commonly between 41 and 50 years age group [Figure 1].

The most common benign thyroid lesion in our study is colloid goitre [42 (70%) cases], second highest cases were of thyroiditis [7 (11.6%) cases], followed by follicular adenoma [3 (5%) cases]. The overall incidence of benign thyroid lesions was 93.3%. Most of the malignant lesions were seen in the 31–40 years and 41–50 years age group. In our study, the most common malignant thyroid lesion was papillary thyroid carcinoma [3 (5%) cases], and 1 (1.6%) case was of anaplastic carcinoma. The overall incidence of malignant thyroid lesions was 6.6% [Table 2].

Overall accuracy, sensitivity, specificity, positive predictive value, and negative predictive value of FNAC in diagnosis of both benign and malignant lesions were 95%, 87.5%, 96.15%, 77.77%, and 98.03%, respectively.

Discussion

FNAC is now established as a valuable, safe, and expedite test in the diagnostic management of various thyroid diseases. The technique is safe, simple, and quick with a low complication rate. FNAC is usually the first line of diagnosis, and other investigations such as ultrasonography examination, thyroid function tests, thyroid scan, and antibody levels are performed consequently with an aim to choose the patients who warrant surgery and those who can be managed conservatively.[7,8]

In our study, the age of the participants ranges from 6 month to 80 years, with median of 43 years, which is comparable with the studies done by Knatasueb et al.,[9] Gupta et al.,[10] and Patel.[7] We found that female subjects were commonly affected and male to female ratio was 1:9 in our study; similar female preponderance was found in the studies done by Patel[7] and Unnikrishnan and Menon[11] The most common cytological diagnosis was colloid goitre (70%) in this study. Similar findings were observed by Patel.[7] In our study, the overall reported benign thyroid lesion was 93.3% and malignant lesion was 6.6%, which was comparable with those reported in the study by Kantasueb et al.[6–11] Goitre is one of the most common types of thyroid lesion in developing countries. Other diagnosis observed are thyroiditis [7 (11.6%) cases], follicular adenoma [3 (5%) cases], thyroglossal cyst [2 (3.3%) cases], benign cystic lesion [1 (1.6%) case], hyalinizing trabecular tumor [1 (1.6%) case]. In this study, the most common malignant thyroid lesion was papillary thyroid carcinoma [3 (5%) cases], and 1 (1.6%) case was of anaplastic carcinoma.

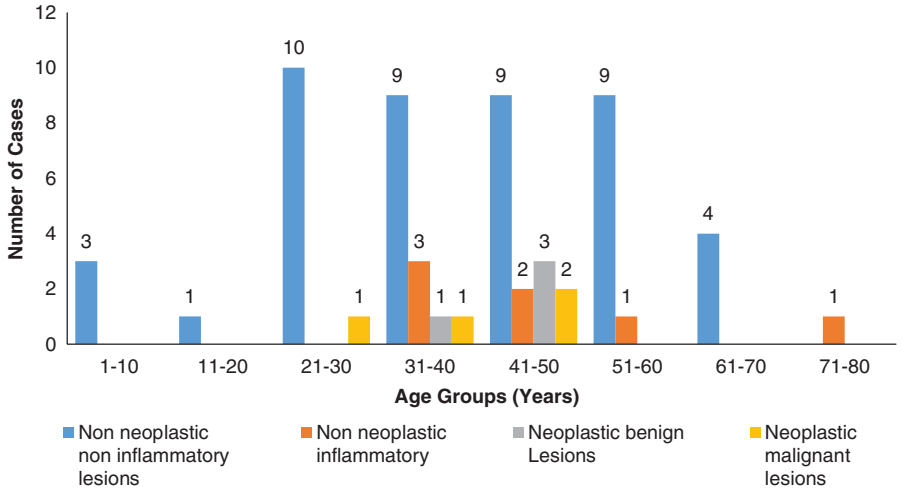

Figure 1: Age-wise distribution of thyroid lesion.

Table 1: Comparison of result of thyroid test between FNAC and histopathology findings

Diagnosis	FNAC, *n* (%)	Histodiagnosis, *n* (%)
Benign lesions		
Colloid goiter	38 (63.3)	42 (70)
Benign thyroid cyst	1 (1.6)	1 (1.6)
Thyroglossal cyst	2 (3.3)	2 (3.3)
Follicular adenoma	—	3 (5.0)
Hashimoto's thyroiditis	7 (11.6)	6 (10.0)
Lymphocytic thyroiditis	1 (63.3)	1 (1.6)
Hyalinising trabecular tumour	—	1 (1.6)
Other	2 (3.3)	—
Total	51 (85.0)	56 (93.3)
Malignant lesions		
Papillary carcinoma	3 (5.0)	3 (5.0)
Anaplastic carcinoma	1 (1.6)	1 (1.6)
Other	5 (8.3)	—
Total	9 (15.0)	4 (6.6)

The analysis of FNAC results after the histopathological examination of postoperative tissue showed sensitivity, specificity, positive predictive value, and negative predictive value as follows: 87.5%, 96.15%, 77.77%, and 98.03%, respectively. These results are also comparable with the results obtained by other studies [Table 3]. In nonneoplastic lesions, i.e., colloid goitres, of 38 cases, 37 were histopathologically correct and one was incorrect, which was diagnosed later as follicular adenoma. In benign cystic lesions, the one case was corrected with histological findings. In thyroiditis, of the eight cases, seven were correct and one was incorrect, which case was diagnosed as colloid goitre instead of thyroiditis in histology examination. The neoplastic benign lesions included four cases of follicular neoplasm. These four cases of follicular neoplasm were diagnosed as follicular adenoma, insular variant of papillary carcinoma, hyalinizing trabecular tumor, and nodular goitre, with each one case.

In the cases of malignant lesions, three cases were of papillary carcinoma; of these, two cases were correlated with histopathological examination and one case of anaplastic carcinoma was corrected with histological findings. In this study, two cases were diagnosed as thyroglossal cyst by FNAC, which were confirmed by histopathological examination [Table 2].

Table 2: Correlation between cytodiagnosis and histodiagnosis

Cytological diagnosis	Histological diagnosis	No. of cases	Remarks
Colloid goiter	Colloid goiter	3	
Benign cystic lesion	Benign cystic lesion	1	
Diffuse toxic goiter	Colloid goiter	2	
Hashimoto's thyroiditis	Hashimoto's thyroiditis	6	True negative, total = 50
Lymphocytic thyroiditis	Lymphocytic thyroiditis	1	
Thyroglossal cyst	Thyroglossal cyst	2	
Thyroiditis	Colloid goiter	1	
Follicular neoplasm	Follicular adenoma	1	
	Hyalinizing trabecular tumor	1	
	Insular variant of papillary carcinoma	1	True positive, total = 7
Papillary carcinoma	Papillary carcinoma	2	
Possibility of Medullary carcinoma	Follicular adenoma	1	
Anaplastic carcinoma	Anaplastic carcinoma	1	
Possibility of Papillary carcinoma	Nodular goiter	1	False positive, total = 2
Follicular neoplasm	Nodular goiter	1	
Adenomatous goiter	Follicular adenoma	1	False negative, total = 1

Table 3: Comparison of diagnostic value for neoplastic lesions

Parameters	Muratli et al.[12] (%)	Kantasueb et al.[9] (%)	Bagga and Mahajan[5] (%)	This study (%)
Accuracy	77.3	88.40	96.2	95
Sensitivity	87.1	74.7	66	87.5
Specificity	64.6	93.22	100	96.15
Positive predictive value	76.1	79.49	100	77.77
Negative predictive value	79.5	91.29	96	98.03

Conclusion

The efficacy of FNAC for diagnosing thyroid lesions (benign versus malignant) in our institute was quite reliable. We showed high specificity > 95% with high negative predictive value (98.03%), which meant there was a low false negative rate, showing the efficacy of FNAC. We showed >85% sensitivity and 77.77% positive predictive value; so, there is more than 10% chance of being falsely (false positive rate) diagnosed as positive. However, the causes of rather false positive rates should be identified to improve the efficacy of FNAC in the future.

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