

Efficacy of Fine Needle Aspiration Cytology in the Diagnosis of Thyroid Nodule

*Shariar S,¹ Mahdia T,² Kayes MT,³ Ahmed NU,⁴ Sultana N,⁵ Keya SA,⁶ Talukder SI⁷

Thyroid swellings are common and the principal method of diagnosis is fine-needle aspiration cytology (FNAC). It is recommended as the first and the most decisive diagnostic step in the workup of patients with nodular thyroid disease. The objective was to find out the efficacy of Fine Needle Aspiration Cytology in the diagnosis of thyroid nodule. This study was conducted in the Department of Pathology, Sylhet M.A.G. Osmani Medical College from 1st July, 2014 to 30th June, 2015 which included 70 patients with thyroid nodule. Meeting the inclusion criteria both FNAC and open biopsy were assessed for specificity, sensitivity, accuracy, positive predictive values and negative predictive values. The age of patients ranges from 11 to 70 years with female predominance. By FNA cytology benign, malignant and indeterminate lesions were 90%, 7.2% and 2.8% respectively. Indeterminate lesions were proved to be malignant by histopathology. So histopathologically benign lesions were 97.2% and malignant lesions were 2.8%. The sensitivity, specificity and accuracy of FNAC was 71.4%, 100% and 97.2% respectively. Positive and negative predictive values were 100% and 96.9% respectively. By those values it seems that FNAC is a useful and reliable diagnostic technique with a high diagnostic accuracy which can provide a highly sensitive diagnosis. Despite lower tissue diagnostic yield compared to FNAC remains a safe and appropriate first line investigation of thyroid swelling.

[SSNI Med Col J 2017 Jan; 2 (1):19-23]

Key words: Fine needle aspiration cytology (FNAC), thyroid nodule

Introduction

Thyroid nodules are common clinical findings and have a reported prevalence of 4% to 7% in the general population.¹⁻³ Thyroid nodules are more common in women, and the incidence increases with age, a history of radiation exposure, and a diet containing goitrogenic material. The vast majority of these nodules are non-neoplastic lesions or benign neoplasms. However, the distinction of these benign lesions from a malignancy cannot be based reliably on the clinical presentation

only. Several diagnostic tests, such as radionuclide scanning, high-resolution ultrasonography, and fine needle aspiration cytology have been used to select the patient population requiring surgical intervention.¹ Thyroid gland and its enlargement are known since the time of Hippocrates. Among the endocrine organs, diseases of the thyroid gland are the most common. A good number of diseases affect the thyroid gland and almost all of them presents with nodular thyroid swelling.

1. Dr. Sakib Shariar, Assistant Professor, Department of Pathology, Uttara Adhunik Medical College, Dhaka. sakibpath@yahoo.com
2. Dr. Tehniat Mahdia, RMO, Department of Ophthalmology, Ispahani Islamia Eye Hospital, Dhaka
3. Dr. Mohammad Tanvir Kayes, Assistant Professor, Department of Pathology, Shaheed Syed Nazrul Islam Medical College, Kishoreganj
4. Dr. Nasir Uddin Ahmed, Pathologist, Department of Pathology, Faridpur Medical College, Faridpur
5. Dr. Nadia Sultana, Lecturer, Department of Pathology, Sylhet MAG Osmani Medical College, Sylhet
6. Dr. Shamim Ara Keya, Lecturer, Department of Pathology, Shaheed Suhrawardy Medical College, Dhaka
7. Dr. Sadequel Islam Talukder, Assistant Professor and Head, Department of Pathology, Shaheed Syed Nazrul Islam Medical College, Kishoreganj

*For correspondence

Nodular goiter remains a problem of enormous magnitude all over the world, although exact data on incidence and prevalence are unavailable. In our country the national prevalence rate is 10-15%, which indicates, the whole country is endemic. The endemicity varies from one place to another. The highest prevalence rate in Bangladesh is in the district of Rangpur and Jamalpur, the range varies from 21-30%. Nodular thyroid disease is more prevalent than diffuse goitre. In a report from the thyroid clinic, BSMMU, Dhaka 32.67% of all thyroid patients had solitary nodules.² A solitary nodule has a higher risk of being malignant, than the multiple multinodular goiter.³ The challenge to the clinician is to select patients, whose gland harbor thyroid cancer from the large group of patients, with thyroid nodules.⁴ Laboratory investigations other than FNAC have limited role to find out the nature of thyroid swelling. Isotope scan can demonstrate the functioning capacity of the nodule but cannot predict the histopathological character.⁵ Ultrasonographic scanning is capable of differentiating solid from cystic lesion but cannot distinguish malignant from benign one.^{4,6} The high degree of diagnostic accuracy, low cost and minimal invasive nature of the procedure makes FNAC a highly desirable alternative technique to open biopsy for investigation of thyroid swelling.⁷ So, this study has been designed to evaluate the efficacy of FNAC in the diagnosis of thyroid swelling in adult considering histopathology as the gold-standard.

Methods

A Cross sectional study was done in the Department of Pathology Sylhet MAG Osmani Medical College, Sylhet from July, 2014 to June, 2015. It included 70 cases of thyroid nodule fulfilling inclusion criteria (both male and female patients, all age groups). The diagnostic criterion for thyroid

nodule was the triple assessment including clinical, radiological and tissue diagnoses. A well informed consent was taken. The technique, risks, benefits, results and associated complications of the procedure were discussed with all patients. A detailed history was taken and the patient was thoroughly examined. Fine needle aspiration cytology was performed in all cases by the same cytopathologist. Thyroid surgery was performed by Head-Neck surgeon and specimens were examined by the same histopathologist. The statistical analysis was performed using the statistical program for social sciences (SPSS version 21). All the relevant information was documented on a pre-designed proforma. Sensitivity, specificity, accuracy, positive predictive value and negative predictive value were calculated.

Results

A total 70 cases of thyroid swelling were taken. The commonest affected age group was 31-40 years followed by 21-30 years. 23 were males (32%) and 47 (68%) females.

Table 1: The age and sex distribution of patients with thyroid disease was as follows

Age Group (Years)	Male	Female	Total	%
0-10	-	-	-	-
11-20	3	6	9	12.8 %
21-30	5	12	17	24.2 %
31-40	11	14	25	35.7 %
41-50	3	8	11	15.7 %
51-60	1	5	6	8.5 %
>60	-	2	2	2.8 %

Table II: Cytological diagnosis of 70 cases of thyroid swelling

Cytological diagnosis	Number	%
Nodular goiter	41	58.6
Simple goiter	7	10.0
Chronic lymphocytic thyroiditis	10	14.3
Acute supportive thyroiditis	5	7.1
Papillary carcinoma	5	7.1
Follicular neoplasm	2	2.9

Table III: Histopathological diagnosis of 70 cases of thyroid swelling

Histopathological diagnosis	Number	%
Nodular goiter	48	68.6
Chronic lymphocytic thyroiditis	10	14.3
Acute supportive thyroiditis	5	7.1
Papillary carcinoma	7	10.0

Comparison between FNAC and histopathological diagnosis in 70 cases of thyroid swellings

Table IV shows diagnostic accuracy of FNAC in relation to histopathological diagnosis. Of the total 70 cases, 68 were correctly diagnosed by FNAC with a diagnostic accuracy was 97.2%. In the remaining 2 cases, FNA diagnosis was follicular neoplasm which was diagnosed as papillary carcinoma by histopathology.

Table IV: Individual comparison between FNAC and histopathological cases

Histopathological diagnosis	Number of cases	FNAC diagnosis					
		Nodular goiter	Simple goiter	Chronic lymphocytic thyroiditis	Acute supportive thyroiditis	Papillary carcinoma	Follicular neoplasm
Nodular goiter	48	41	07	00	00	00	00
Chronic lymphocytic thyroiditis	10	00	00	10	00	00	00
Acute supportive thyroiditis	05	00	00	00	05	00	00
Papillary carcinoma	07	00	00	00	00	05	02
Total	70	41	07	10	05	05	02

Statistical comparison between FNAC and histopathology in the diagnosis of thyroid swellings

In this study, true positive (TP) were 5 cases, false negative (FN) were 2 cases, true negative (TN) were 63 cases and no false positive (FP) were diagnosed by FNAC in relation to histopathological diagnosis.

Table V: Statistical comparison between FNAC and histopathology.

Histopathology	Number of cases	FNA Cytology		
		Malignant	Benign	Indeterminate
Malignant	07	05 (TP)	00	02 (FN)
Benign	63	0	63 (TN)	00
Total	70	05	63	02

Discussion

In this study maximum numbers of patients were in the age group 31 to 40 years followed by the age group 21-30 years. Kamra H.T et al.,⁸ in their study also found maximum number of patients in the age group 31-40 years.

Thyroid diseases are more common in women (68%) than male (32%) population. Maximum numbers of patients in this study were also females. This result was in accordance with the study of Singal et al.⁹ in which 59.86% were females and 40.13% were

males. Gupta et al¹⁰ found that 61.64% patients were females and 38.36% were males.

FNAC diagnosis of nodular colloid goiter was made in 41 (58.6%) cases, simple colloid goiter in 7 (10.1%) cases, chronic lymphocytic thyroiditis in 10 (14.3%) cases, acute supportive thyroiditis in 5 (7.1%) cases, papillary carcinoma in 5 (7.1%) cases and follicular neoplasm in 2 (2.9%) cases of the total 70 cases of thyroid swellings. Huq et al.¹¹ reported nodular goiter in 11 (57.9%) cases, papillary carcinoma in 3 (15.8%) cases, follicular neoplasm in 3 (15.8%) cases, thyroglossal cyst in 1 (5.26%) case and unsatisfactory smear in 1 (5.26%) case of the total 19 thyroid swellings. Adhikari, Shrestha & Sharma¹² found nodular colloid goiter in 21 (58.4%) cases, autoimmune thyroiditis in 6 (16.7%) cases, follicular neoplasm in 5 (13.9%) cases, papillary carcinoma in 2 (5.5%) cases and inconclusive in 2 (5.5%) cases out of 36 thyroid swellings. The findings of different studies have concordance with the present study.

Histopathological diagnosis of nodular colloid goiter was made in 48 (68.6%) cases, chronic lymphocytic thyroiditis in 10 (14.3%) cases, acute supportive thyroiditis in 5 (7.1%) cases and papillary carcinoma in 7 in (10.1%) cases. Similar findings were found by Islam et al.¹³ in which nodular colloid goiter was 73.4%, follicular adenoma 3.3% and carcinoma 21.1%.

Sensitivity, specificity and accuracy of fine needle aspiration cytology in detecting malignant lesions were 71.4%, 100% and 97.2% respectively. Positive predictive value and negative predictive value were 100% and 96.9% respectively. Singal et al.⁹ found the sensitivity, specificity, accuracy, positive and negative predictive values 91.6%, 98.2%, 96.6%, 94.2%, and 97.3% respectively. Poorey & Tyagi¹⁴ reported the sensitivity,

specificity, accuracy, positive and negative predictive values of FNA in the diagnosis of neoplastic mass 81.8%, 95.1%, 92.1%, 81.8%, and 95.0%, respectively. It can be concluded that sensitivity, specificity, positive predictive value, negative predictive and diagnostic accuracy of the present study were concordance with those of reported series.

Accuracy of FNAC was determined. Of the 70 cases, 68 were diagnosed correctly by FNAC with a diagnostic accuracy of 97.2%. In the remaining 2 cases FNA diagnosis was follicular neoplasm which was diagnosed as papillary carcinoma by histopathology. In the study of Islam et al.¹³ the diagnostic accuracy of FNAC in thyroid swelling was 94.44% that has concordance with the present study.

Conclusion

FNAC is a simple, rapid, safe and reliable technique. Thyroid swellings are easily accessible by FNA and it yielded excellent diagnostic material. No false positive diagnosis was reported in the present study. The accuracy of Fine Needle Aspiration Cytology (FNAC) in the diagnosis of thyroid swellings was excellent when compared with histopathology.

References

1. Amrikachi M, Ramzy I, Rubinfeld S and Wheeler TM. Accuracy of Fine Needle Aspiration of Thyroid. Arch Pathol Lab Med, 2001; 125(4):484-488.
2. Alauddin M, Joarder MAH. Management of thyroid carcinoma. A Review Article, Bangladesh J Otolaryngol, 2003; 9(1/2):23-37.
3. Hilal M Al- Sayer, Zygmunt H Krukowski, Valerie M M Williams, Norman A Matheson. Fine needle aspiration cytology in thyroid swellings: a prospective two year evaluation. British Medical Journal 1985; 290:1490-1492.
4. Hanni CL, Bratt HJ, Dean RE, Vanvliet PD. Fine Needle Aspiration biopsy- A

- reliable diagnostic tool in the management of thyroid nodules, *The American Surgeon*; 1984; 50:485-487.
5. Sattar MA, Alam MM, Haider A. Clinicopathological study of solitary cold thyroid nodule, *Bangladesh J Otolaryngol*, 2003; 9(1/2):24-27.
 6. Pendse AK, Gupta SP. A Clinicopathological analysis of one hundred operated cases of goitre. *J.Indian M. A.* 1983; 80 (11, 12):172-175.
 7. Jasani JH, Vaishnani HV, Vekaria PN, Patel D, Shah Y, Savjiani N, Patel D and Lakhani D. Retrospective study of fine needle aspiration cytology of head and neck lesion in tertiary care hospital. *IJBAR*, 2013; 4(4):253-256.
 8. Kamra HT, Agarwal R, Rana P, Kalra R, Kaur S, Duhan A, Verma S and Agarwal D. Evaluation Profile of Thyroid Nodule by FNAC in the Rural Population of Khanpur Kalan, Sonapat, Haryana. *Journal of Clinical and Diagnostic Research*, 2014;8(10).
 9. Singal P, Bal, MS, Kharbanda J and Sethi PS. Efficacy of fine needle aspiration cytology in Head and Neck lesions. *IJMDS*, 2014; 3(2):421-430.
 10. Gupta G, Joshi DS, Shah A, Gandhi M. and Shah NR. FNAC of Head and Neck Swellings. *GCSMC J Med Sci*, 2014; 3(1):38-41.
 11. Huq MM, Ali MI, Huque SMN, Alam KMN, Sattar MA and Tarafder KH. Evaluation of neck swelling by cytological and histopathological examination. *Bangladesh J Otorhinolaryngol*, 2012; 18(1):23-29.
 12. Adhikari RC, Shrestha HK and Sharma SK. Fine Needle Aspiration Cytology of Neck Masses in a Hospital. *J Nepal Health Res Counc*, 2014; 12(27):104-108.
 13. Islam MS, Siddiquee BH, Akhtar N, Salam KS and Aktaruzzaman M. Comparative study of FNAC and histopathology in the diagnosis of thyroid swelling. *Bangladesh J Otorhinolaryngol*, 2010; 16(1):35-43.
 14. Poorey VK and Tyagi A. Accuracy of Fine Needle Aspiration Cytology of Head and Neck Masses. *Indian J Otolaryngol Head Neck Surg*, 2014; 66(22):182-186.