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Value and Diagnostic Accuracy of Fine Needle Aspiration Cytology in Thyroid Lesions

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Abstract

Background: Thyroid enlargement is a common problem and causes various pressure symptoms. Majority of swellings does not require surgery. Fine needle aspiration cytology (FNAC) is considered the gold standard diagnostic test in the evaluation of thyroid swellings. In the present study we correlated the FNAC findings with histopathology so that rate of unnecessary thyroidectomise in benign pathologies could be avoided.

Method: The present study is a prospective analysis of 50 cases of thyroid swellings which were done over a period of 1 years from August 2017 to July 2018. These cases were underwent FNAC followed by surgery. Correlation of histopathological findings was performed with FNAC. Sensitivity, specificity, accuracy, positive predictive value, and negative predictive value were calculated.

Results: After comparison of results of FNAC with histopathology, FNAC showed overall diagnostic accuracy of 96.00 % with specificity of 96.00% , sensitivity of 100.00% for all lesions, positive predictive value of 100.00% for all lesions and negative predictive value of 83.36% in our study.

Conclusion: FNAC is a sensitive, specific, accurate, cost effective and minimally invasive diagnostic test for evaluation and management for thyroid lesions. It can be used in differentiating lesions that require surgery from those can be manage conservatively.

Keywords: FNAC, Specificity, Sensitivity.

Introduction

The thyroid gland is the most accessible and largest endocrine gland in the body. Normal thyroid gland is impalpable. It was one of the earliest endocrine gland to be recognized, investigated and researched into. It is situated in the lower part of front and the sides of the neck[1]. Its main function is regulation of the basal metabolic rate, stimulation of somatic and psychic growth.[2]

Thyroid swelling remains a problem of enormous magnitude all over the world. The problem in clinical practice is to distinguish reliably the few malignant tumors from the many harmless nodules so that a definitive preoperative tissue diagnosis of the malignancy allows planning of appropriate surgery and relevant patient counseling. The prevalence of thyroid swelling ranges from 4% to 10% in the general adult population and from 0.2% to 1.2% in children[2]. The majority of clinically diagnosed thyroid swellings are non-neoplastic; only 5% to 30% are malignant and require surgical

intervention[3].FNAC, however, is not without limitations related to specimen adequacy, sampling techniques, skill of performing the aspiration, interpretation of the aspirate and overlapping cytological features between benign and malignant follicular neoplasm and also in the detection of some papillary carcinomas because of associated thyroid pathology including multinodular goiter, thyrotoxicosis and marked cystic changes.The main goal of evaluating these lesions by FNAC is to identify lesions with malignant potential and get prompt management of them, considering the limitations of open biopsy and advantages of FNAC.

The present study aims are diagnose various thyroid diseases based upon cytomorphological features with its histopathological correlation. Also the study is intended to evaluate the sensitivity and specificity of fine needle aspiration cytology procedure and its interpretation.

Material & Methods

Study design: A prospective study.

Study duration: one year

Study place: Department of General Surgery, S.P. Medical College and P.B.M Hospital, Bikaner

Sample size: Fifty cases of thyroid swelling referred to P.B.M Hospital, in the study period and fulfilling eligibility criteria were included in the study.

Inclusion Criteria

1) Any type of thyroid swellings**.**
2) Patients of all ages, sex & socioeconomic status.

Exclusion Criteria

- Patients who refused to give consent to participate into study.

Procedure of Data Collection

After admission, informed written consent was obtained from patients fulfilling the inclusion criteria. The findings of history, clinical examination, and demographic characteristic was noted for each patient. All patients were evaluated by thorough clinical examination followed by routine investigations including haemogram, renal function tests, liver function tests, chest X-ray, thyroid function tests and, FNAC.

Data Analysis

To collect required information from eligible patients a pre-structured pre-tested Proforma was used. For data analysis Microsoft excel and statistical software SPSS was used and data was analyzed with the help of frequencies, figures, proportions, measures of central tendency, appropriate statistical test.

Observations

The present study was undertaken to diagnosis various thyroid lesions based upon cytomorphological features with its histopathological correlation at tertiary care Hospital in Western Rajasthan in Dept. of general Surgery, S.P.Medical College, Bikaner. Fifty cases of thyroid swelling referred to P.B.M Hospital, in the study period and fulfilling eligibility criteria were included in the study over a period of 12 months from Aug. 2017 to July 2018.

In our study the mean age of patients was 39.52±12.60 yrs with range of 11 – 62 yrs. Most of the patients (32.00%) were in the age group of 41 – 50 yrs. Most of the patients were females: 34 (68.00 %) out of the total 50 cases. Male to female ratio was 1: 2.15.

Table no.1. Lesion wise distribution

Lesion	No. of patients	Percentage
Benign	47	94.00 %
Malignant	3	6.00 %
Total	50	100.00 %

Out of the total 50 cases of FNAC , 47 cases (94.00 %) were non – neoplastic and 3 (6.00%) were neoplastic lesions.

Table No.2. Incidence Of Non – Neoplastic Thyroid Lesions According To FNAC(N=47)

Benign lesion	No. of patients	Percentage
colloid goiter	25	50.00 %
Benign follicular lesion	17	34.00 %
Benign cyst	1	2.00 %
Oncocystic tumour	1	2.00 %
Hashimoto's thyroiditis	3	6.00 %
Total	47	94.00 %

47 cases of benign/non-neoplastic diagnosis , colloid goiter was the most common thyroid lesion diagnosed in 25(50.00%) cases. The other benign lesions diagnosed were Benign follicular lesion 17(34.00%) cases, hashimoto's thyroiditis in 3(6.00%) cases , Oncocystic tumour in 1(2.00%) case and benign cyst in 1(2.00%) case.

Table No.3. Incidence Of Neoplastic Thyroid Lesions According To FNAC(N=3)

Malignant lesion	No. of patients	Percentage
Follicular carcinoma	0	0.00 %
Papillary carcinoma	3	6.00 %
Total	3	6.00 %

3 malignant lesions on cytology, papillary carcinoma was diagnosed in all 3(6.00%) cases.

Table No.4. Cytohistopathological Correlation of Thyroid Lesions.

Cytological diagnosis	No. of cases	Histopathological diagnosis						
		Colloid goiter	Hashimoto's thyroiditis	Benign cyst	Oncocystic adenoma	Follicular carcinoma	Benign follicular lesion	Papillary carcinoma
Colloid goiter	25	25	0	0	0	0	0	0
Benign follicular lesion	17	0	1	0	0	1	14	1
Benign cyst	1	0	0	1	0	0	0	0
Oncocystic tumour	1	0	0	0	1	0	0	0
Hashimoto's thyroiditis	3	0	3	0	0	0	0	0
Papillary carcinoma	3	0	0	0	0	0	0	3

Histopathological diagnosis was available in all 50 cases. 3 cases of papillary carcinoma on FNAC which were subsequently examined on histopathology were found to be papillary carcinoma in all 3 cases. In 17 cases of benign follicular lesion on FNAC there was 1 papillary carcinoma,1follicular carcinoma,1hashimoto thyroiditis and 14 cases were benign follicular lesion proved on histopathological examination . 3 cases of hashimotos thyroiditis were confirmed histologically. 1 case of oncocystic tumour and 1 case of benign cyst reported on FNAC were confirmed on biopsy. All 25 cases of colloid goiter were detected same benign on histopathological examination. FANC cannot differentiate benign follicular lesion from follicular carcinoma because this distinction can only be based on the presence of capsular or vascular invasion and this cannot be detected on a cytologic smear,so 1case of follicular carcinoma detected on histopathology not affect diagnostic accuracy of FNAC

After comparison of results of FNAC with histopathology, FNAC showed overall diagnostic accuracy of 96.00 % with specificity of 96.00% , sensitivity of 100.00% for all lesions, positive predictive value of 100.00% for all lesions and negative predictive value of 83.36% in our study.

Table No.5. Sensitivity, Specificity And Diagnostic Accuracy Of Fnac In Our Study

Accuracy Of FNAC	Percentage (%)
Sensitivity	100.00 %
Specificity	96.00 %
Positive Predictive Value	100.00 %
Negative Predictive Value	83.36 %
Diagnostic Accuracy	96.00 %

Discussion

The present study was undertaken to diagnosis various thyroid lesions based upon cytomorphological features with its histopathological correlation at tertiary care Hospital in Western Rajasthan in Dept. of general Surgery, S.P.Medical College, Bikaner. Fifty cases of thyroid swelling referred to P.B.M Hospital, in the study period and fulfilling eligibility criteria were included in the study over a period of 12 months from Aug. 2017 to July 2018.

In our study out of the 47 cases of benign/non-neoplastic diagnosis , colloid goiter was the most common thyroid lesion diagnosed in 25 cases(50%) cases. The other benign lesions diagnosed were Benign follicular lesion 17(34.00%) cases, hashimotos thyroiditis in 3(6.00%) cases , Oncocystic tumour 1(2.00%) cases and benign cyst in 1(2.00%) cases.

S Gulia et al[4] was observed that of the benign/non-neoplastic diagnosis , colloid goiter was the most common thyroid lesion diagnosed in 74.29% cases. The other benign lesions diagnosed were hashimotos thyroiditis in 3.51% cases , de quervains thyroiditis in 1.43% cases , thyroglossal duct cyst in 2.14% cases , and hyperthyroidism in 1.43% cases.

S. Agrawal et al [5] was observed that colloid goiter was the most common benign thyroid lesion diagnosed in 63.% cases.

Bisi H et al [6]was observed that non-neoplastic lesions comprised 86.68% of the cases (n = 7024), and most of them were nodular goiter (n = 6458).

In our study of the malignant lesions on cytology , papillary carcinoma diagnosed in 3(6.00%) cases. Due to less number of cases in our study on cytologic diagnosis only papillary carcinoma patients were found.

Patel et al[7] was also observed most common neoplastic lesion of the thyroid on cytologic diagnosis was found to be follicular neoplasm (73.81%), followed by papillary carcinoma of thyroid (9.52%), and then by medullary and anaplastic carcinomas of thyroid (4.76% each).

S Gulia et al[4] was observed that the malignant lesions on cytology , follicular neoplasm constituted a total of 13 cases(9.29 %) and papillary carcinoma diagnosed in 9(6.43%) cases.

Bisi H et al[6] was observed that Neoplastic lesions were divided into two groups: primary and metastatic. Out of 1072 primary neoplasms, 530 were benign and 542 were malignant. Out of the malignant neoplasms, papillary and follicular were the most frequent types (n = 201 and 187, respectively), followed by undifferentiated (n = 86), Hürthle (n = 46), medullary (n = 16) and others (n = 6) .

Histopathological diagnosis was available in 50 cases. 3 cases of papillary carcinoma on FNAC which were subsequently examined on histopathology were found to be papillary carcinoma in all 3 cases and In 17 cases of benign follicular lesion on FNAC there was 1 papillary carcinoma, 1.follicular carcinoma, 1 hashimoto thyroiditis and 14 cases were benign follicular lesion proved on histopathological examination . 3 cases of hashimotos thyroiditis were confirmed histologically. 1 case of oncocystic tumour and 1case of benign cyst reported on FNAC were confirmed on biopsy. FANC cannot differentiate benign follicular lesion from follicular carcinoma because this distinction can only be based on the presence of capsular or vascular invasion and this cannot be detected on a cytologic smear,so 1case of follicular carcinoma detected on histopathology not affect diagnostic accuracy of FNAC

After comparison of results of FNAC with histopathology, FNAC showed overall diagnostic accuracy of 96.00 % with specificity of 92.00% , sensitivity of 100.00% for all lesions, positive predictive value of 100.00% for all lesions and negative predictive value of 83.36% in our study.

Many papers on the diagnostic sensitivities for thyroid nodules exist in the literature , showing a wide range from 43 – 100% and specificity from 47 – 100%[8-11]

Factors contributing to this broad range of sensitivity and specificity are the handling of suspicious cases , adequacy of sample , sampling techniques , experience of pathologist in interpretation , length of follow up and inclusion of suspicious/indeterminate cases in the category of false negative diagnosis. In our study ,Diagnostic accuracy of 96.00 % with specificity of 96.00% , sensitivity of 100.00% for all lesions, positive predictive value of 100.00% for all lesions and negative predictive value of 83.36% . The results are comparable with the other studies. Afroze et al(2002)[57] reported in his study sensitivity of 61.9% , specificity of 99.3% , negative predictive value 94.7% , positive predictive value 92.8% and accuracy of 94.5%.

Ikram et al[12] has reported sensitivity and specificity for malignancy as 100% which is higher than our results as they do not have false positive results in their study due to small number of patients.

Kessler et al[13] , 2005 , reported 79% sensitivity , 98.5% specificity , negative predictive value 76.6% , positive predictive value 98.7% and diagnostic accuracy of 87%.

Gupta et al[14] ,2006 , reported 80% sensitivity , 86.6% specificity , 86.6% negative predictive value ,80% positive predictive value and 84% accuracy Surgery is not required in benign lesion because benign lesion are easily detected in FNAC.

Conclusion

FNAC is a sensitive, specific, accurate, cost effective and minimally invasive diagnostic test for evaluation and management for thyroid lesions. It can be used in differentiating lesions that require surgery from those can be manage conservatively

References

1. Pandit AA and Kinare SG. Fine needle aspiration cytology of thyroid. Indian J Cancer. 1986;23(1):54-8.
2. Burch HB, Burman KD, Reed HI, Buckner L, Raber T, Ownbey Jl. Fine needle aspiration of thyroid nodules. Determinants of insufficiency rate and malignancy yield at thyroidectomy. Acta Cytol. 1996 Nov-Dec;40(6):1176-83.
3. Gharib H, Goellner JR. Fine-needle aspiration biopsy of the thyroid: an appraisal. Ann Intern Med. 1993 Feb 15;118(4):282-9.
4. S Gulia, M Chaudhury, E Sitaramam, K Reddy. Diagnostic Accuracy Of Fine Needle Aspiration Cytology In The Diagnosis Of Thyroid Lesions. The Internet Journal of Pathology, 2010;13(1):1-5.
5. S. Agrawal, “Diagnostic accuracy and role of fine needle aspiration cytology in management of thyroid nodules,” Journal of Surgical Oncology, vol. 58, no. 3, pp. 168–172, 1995.
6. Bisi H, J. W. Serpell, and M. S. P. Cheng, “Fine-needle aspiration cytology of thyroid nodules: how useful is it?” ANZ Journal of Surgery, vol. 73, no. 7, pp. 480–483, 2003.
7. Patel NR, Gunjalia AP, Patel HL. Study of cytodiagnosis of thyroid neoplastic lesions and comparison with histopathology. Int J Med Sci Public Health 2016;5:40-43.
8. Dorairajan N , Jayashree N. Solitary Nodule of the Thyroid and the Role of Fine Needle Aspiration Cytology in Diagnosis. J Indian Med Ass 1996 ;94(2) : 50 – 52.
9. Boey J , Hsu C , Collins R J. False Negative Errors in Fine Needle Aspiration Biopsy of Dominant Thyroid Nodules. A prospective follow up study. World J Surg 1986 ;10 : 623 – 30
10. Hamburger J I , Husain M .Semiquantitative Criteria for Fine Needle Biopsy Diagnosis : Reduces False Negative Diagnosis. Diagn Cytopathol 1988 ; 4 : 14 – 17.
11. Singer P A . Evaluation and Management of the Solitary Thyroid Nodule. Otolaryngol Clin of North Am 1996 ; 29 : 577 – 91.
12. Ikram M , Hyder J , Muzaffar S , Hasan SH. Fine Needle Aspiration Cytology in the management of thyroid pathology the Aga Khan University Hospital experience. J Pak Med Assoc 1999 ; 49(6) : 133-5.
13. A. Kessler , H.Gavriel , S.Zahav et al. Accuracy and Consistency of Fine Needle Aspiration Biopsy in the Diagnosis and Management of Solitary Thyroid Nodules . Israel Medical Association Journal 2005 ; 7(6). : 371 – 73.