

ORIGINAL ARTICLE

Role of Fine Needle Aspiration Cytology [FNAC] in diagnosis of Thyroid lesions

K. Shyam Sunder¹, Mohd Inayatulla Khan²

1. Assistant Professor, Department of Pathology, Chalmeda Anandrao Institute of Medical Sciences [CAIMS], Bommakal, Karimnagar
2. Department of Physiology, Rajiv Gandhi Institute of Medical Sciences (RIMS), Adilabad

Abstract

Background: FNAC of the thyroid gland is now a well established first line diagnostic test for the evaluation of diffuse as well as nodular lesions of thyroid. The main purpose of FNAC is confirming benign lesions and thereby reducing unnecessary surgery. **Objectives:** this study was aimed at evaluating experience of FNAC and correlating the findings with tissue biopsy – in the diagnosis of thyroid lesions. **Methods:** Patients with neck swellings attending medical, surgical and ENT outpatient clinics and wards with thyroid lesions were sent to department of pathology, PIMS Hospital, Karimnagar where FNAC was done. Before aspiration, a detailed history and clinical examination was done. FNAC was performed in all cases using 23 Gauge Needle attached to 20 ml disposable syringe. Smear was prepared on standard glass slides fixed and stained with H&E or MGG stains. **Results:** A total of 66 cases were included in the study. Majority of cases were reported as benign lesions by FNAC n=58 (87.88%) and Histopathology showed n=60 (90.91) as benign lesions. The percentage of malignant lesions reported by FNAC was n=8 (12.12%) and by histopathological examination n=6 (9.09%) were reported as malignant lesions. The sensitivity was calculated at 96.67% and the specificity was 96.77% the PPV value was 90.61% and the NPV was 96.77%. **Conclusions:** FNAC is it is a cost effective procedure which can be performed on outpatient basis and it can be repeated due to patient acceptance. Its sensitivity and specificity are within acceptable range provided standard protocol is adopted. It bridges the gap between clinical evaluation and histopathologic diagnosis in majority of cases.

Keywords: Efficiency, FNAC, Thyroid lesions

Address for correspondence: Dr K Shyam Sunder, H.NO. 2-10-1572/1, Siddartha Nilayam Chaithanyapuri, Karimnagar 505001 Telangana State. Mobile: +919849797013. Email: sskasapa@gmail.com

Received on: 12/02/2017 Revised: 21/02/2017 Accepted : 28/02/2017

Introduction

Thyroid lesions are commonly encountered in clinical practice FNAC is a useful evaluation method in assessment of palpable and non-palpable masses. FNAC was first introduced in 1930 by Martin and Ellis, they first presented a tumor diagnosis by needle aspiration and called aspiration biopsy.^[1] Fine needle aspiration cytology (FNAC) is a quick, safe, inexpensive outpatient procedure with less morbidity and without mortality. It is a result oriented procedure which helps in the evaluation of thyroid enlargements helping the clinician in

deciding the line of treatment. It offers first line screening in the diagnosis of thyroid lesions.^[2,3] Most commonly the thyroid cancers are usually presented as palpable nodules or increase in size of a pre-existing nodule.^[4] It becomes important for a surgeon to investigate these changes correctly. It has been estimated that only 5 to 10% of the thyroid nodules are malignant.^[5] The usual method of approach to such presentations previously was to excise these nodules and subject to histopathology examination. However with aid of better diagnostic techniques like FNAC, we can differentiate benign from malignant and in turn avoid unnecessary surgeries.^[6] Currently

American Association of Clinical Endocrinologists [AACE] 2006 implicates fine needle aspiration cytology as an early investigation of choice for thyroid lesions. [4,5] Several studies have reported high sensitivity and specificity of FNAC for predicting thyroid related malignancies by 83% and 92% [7-10] There are however limitation of FNAC because of inadequate sampling, inexperience of pathologists and overlapping cytological features especially in samples obtained from hyperplastic nodule and follicular neoplasms. [11, 12] These are responsible for false-negative rates reported by FNAC up to 5%. In order to reduce such reports they have advocated ultrasound scanning guidance for aspiration. The use of ultrasound and FNAC has definitely increased sensitivity and specificity then either technique along. [4,5] With this background we tried to correlate the FNAC results with the Histopathology results in the diagnosis of Thyroid lesions.

Materials & Methods

Patients with neck swellings attending medical, surgical and ENT outpatient clinics and wards with thyroid lesions were sent to department of pathology, PIMS Hospital, Karimnagar where FNAC was done. Ethical permission for the study was obtained from institutional Ethical Committee. Detailed procedure was explained to the patients and written consent was obtained before the start of the study. History was taken and Clinical examination was done patients

Table 1: Showing the age wise and sex distribution of cases

Sl. No.	Age group (yrs)	Female	Male	Total	Percentage
1	17 – 20	8	1	9	13.64
2	21 – 30	8	3	11	16.67
3	31 – 40	19	4	23	34.85
4	41 – 50	11	4	15	22.72
5	51 – 60	7	1	8	12.12
Total		53	13	66	100

Majority of cases were reported as benign lesions by FNAC n=58 (87.88%) and Histopathology showed n=60 (90.91) as benign lesions. The percentage of malignant lesions reported by FNAC was n=8 (12.12%) and by histopathological examination n=6 (9.09%) were reported as malignant lesions see table 2. The sensitivity was calculated at 96.67% and the specificity was 96.77% the PPV value was

involved were from age group of (17-70 years). Patients were comfortable seated on a chair and head extended taking aseptic precautions the 23 G needle was introduced into swelling from one side after fixing the swelling with the other hand. Suction was created by retracting plunger, and the needle was pushed into the lesion repeatedly. The needle was withdrawn from the lesion with plunger in normal position. The contents were transferred on a standard slide and smear was prepared by crushing the tissue with another slide and spreading it. fixed in 95% ethyl alcohol or Isopropyl alcohol 2-3 slides were made and was stained by H & E and PAP, each and May-Grünwald Giemsa [MGG], wherever necessary, Nuclear details were appreciated nicely with Pap stained smear, whereas cytoplasmic details were better in MGG. Routinely four smears were prepared. The stained smears were examined under microscope. Observations made were recorded.

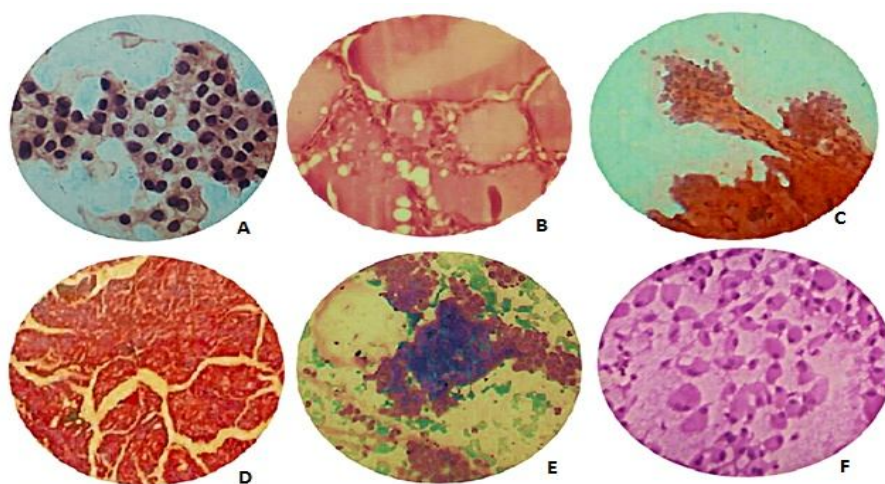
Results

Total number of 66 cases were included in the study were subjected to FNAC and Histopathology for cyto-histological correlation in the present series. Most commonly involved age group was between 30 to 50 years of age group contributing total of 38 patients (57.58%) and the Female to male ratio in our study was 4: 1 which is a common presentation in case of Thyroid related disorders which commonly effects females especially in the 3rd and 4th decades see table 1.

90.61% and the NPV was 96.77%. In our study presentation we have included in the cases in which we could have obtained histopathological correlations and all the other cases in which FNAC was inadequate of those case in which histopathological correlation could not be obtained or cases in which final conclusion about diagnosis was not reached have not been included in this present study.

Table 2: showing Cytohistopathological correlation

Diagnosis	FNAC n (%)	Histopathology n (%)
Colloid Goiter	40 (60.60)	43 (65.15)
Thyroglossal cyst	1 (1.5)	1 (1.5)
Benign thyroid cyst	2 (3)	2 (3)
Lymphocytic thyroiditis	1 (1.5)	1 (1.5)
Hashimoto's Thyroiditis	10 (15.15)	9 (13.63)
Follicular Adenoma	1 (1.5)	4 (6.06)
Others	2 (3)	-
Total	58 (87.88)	60 (90.91)
Malignant Lesions		
Papillary Carcinoma	2 (3)	3 (4.5)
Medullary Carcinoma	2 (3)	2 (3)
Anaplastic carcinoma	1 (3)	1 (1.5)
Others	3 (4.5)	-
Total	8 (12.12)	6 (9.09)



A: FNAC of Colloid Goiter, B: Histopathology Colloid Goiter H & E stain, C: FNAC Papillary Carcinoma H & E stain, D: Histopathology Papillary Carcinoma H & E stain E: Adenomatoid Goiter Leishman stain, F: FNAC Medullary Carcinoma H & E stain.

Discussion

In the present study 66 patients were included out of which Females were n=53 (80.3%) and male only 13 (19.69%) giving a ratio of approximately 4:1 similar female preponderance for thyroid lesions were found in other studies. [13,14] In the study we found that non-neoplastic lesions were predominant 60 out of 66 (90.91%) and neoplastic lesions were 6 (9.09%) which is in agreement with other similar studies. [15-17] Surgery had to be performed in many cases including the cases of large goiters an autoimmune thyroiditis, because of the large size and pressure symptoms. Similar observations were made by Gharib et al; [18] The most common cytopathology diagnosis was goiters followed by autoimmune thyroiditis see

table 2. Similar observations were made by Patel M [13] Goitre is one of the most common types of thyroid lesion in developing countries. The diagnosis of goitre was made when there was abundant colloid with follicular cells in monolayered sheets were seen. In addition to this, when haemosiderin laden macrophages were there a diagnosis of multinodular goitre was made. In two cases of follicular adenoma FNAC did not show any conclusive evidence for definitive diagnosis they were however confirmed by histopathology examination. Two cases of suspicious diagnosis were later reported to be of nodular goitre by histopathology. Smears in which macrofollicular arrangement leads to misdiagnosis of probably suspicious nature similar observations made by Orell et al; [19] In our study Auto-immune thyroiditis

occurred predominantly in female in 3rd and 4th decades similar to findings of Rajesh SP et al; [20] Hashimoto's thyroiditis was commonest lesions diagnosed after goiters. The classical feature for diagnosis of Hashimoto's thyroiditis was presence of follicular cells intermingled with lymphocytes and Hutherlization with fibrotic tissue the presence of Hurthle cells clinches the diagnosis of Hashimoto's thyroiditis. The sensitivity was at 96.67% and the specificity was 96.77% the PPV value was 90.61% and the NPV was 96.77% this is in agreement to a similar study done by Rashik H et al; [21] In this study we found 2 cases of papillary carcinoma by FNAC, in one case definitive diagnosis was not made and it was kept in other suspicious lesions category in which one was later found out to be papillary carcinoma and two cases turned out to be follicular adenomas by histopathological diagnosis. Papillary carcinomas are the commonest malignant lesions especially in female and are diagnosed by FNAC based on the presence of monolayered sheets of follicular cells, papillary arrangement, fibrovascular core, nuclear grooves and intra-nuclear cytoplasmic inclusions. However one should also keep in mind that the distinction between follicular adenoma and follicular carcinoma is extremely difficult even with experienced hands. Therefore extreme care should be taken to reach final conclusion. In our present study we found 2 cases of Medullary carcinoma. The diagnosis of medullary carcinoma is made by presence of solid non-follicular histology pattern. The presence of amyloid in the stroma and there are high chances of lymphnode metastases. [22] This tumor is however clinically graded as intermediate grade malignance despite its undifferentiated character. However it is important to distinguish it from high malignant solid form of anaplastic carcinoma and from papillary carcinoma which is a lower grade malignancy. From this study we find that FNAC is a very good tool for diagnosis of Thyroid related malignances however in certain suspicious cases a definite diagnosis may be only obtained by Histopathology.

Conclusion

FNAC is it is a cost effective procedure which can be performed on outpatient basis and it can

be repeated due to patient acceptance. Its sensitivity and specificity are within acceptable range provided standard protocol is adopted. It bridges the gap between clinical evaluation and histopathologic diagnosis in majority of cases.

Conflict of Interest: None declared

Source of Support: Nil

Ethical Permission: Obtained

References

1. Ariga R, Bloom K, Reddy VB, Klusken L, Francescatti D, Dowlath K, et al; Fine needle aspiration of clinically suspicious palpable breast masses with histopathologic correlation. *Am J Surg* 2002;184(5):410-13.
2. Afroze N, Kayani N, Hassan SH. Role of fine needle aspiration cytology in diagnosis of palpable thyroid lesions. *Indian J Pathol Microbiol* 2002;45:241-46.
3. Handa U, Garg S, Mohan H, Nagarkar N. Role of fine needle aspiration cytology in diagnosis and management of thyroid lesions: A study on 434 patients. *J Cytol* 2008;25:13-17.
4. Perros P (editor), British Thyroid Association, Royal College of Physicians. Guidelines for the management of thyroid cancer. Report of the Thyroid Cancer Guidelines Update Group, 2nd ed. London, Royal College of Physicians; 2007.
5. Cobin RH, Gharib H, Bergman DA, Clark OH, Cooper DS, Daniels GH, et al. AACE/AAES medical/surgical guidelines for clinical practice: management of thyroid carcinoma. *Endocr Pract* 2001;7:202-20.
6. Sandeep GM, Navin M, Prad M. Investigating value of FNAC in thyroid cancer. *Jour of Cytology* 2011; 28(4): 185-90.
7. Gharib H. Fine-needle aspiration biopsy of thyroid nodules: Advantages, limitations, and effect. *Mayo Clin Proc* 1994; 69:44-49.
8. Castro MR, Gharib H. Thyroid fine-needle aspiration biopsy: Progress, practice, and pitfalls. *Endocr Pract* 2003; 9:128-36.
9. Gharib H, Goellner JR. Fine-needle aspiration biopsy of thyroid nodules. *Endocr Pract* 1995; 1:410-17.

10. Jeffrey PB, Miller TR. Fine-needle aspiration cytology of the thyroid. *Pathology (Phila)* 1996;4:319-35.
11. Jagoi S, Al- Jassar A, Temmim L, Dey P, Adesina AO, Amanguno HG. Fine needle aspiration cytology of the thyroid: a cytohistological study with evaluation of discordant cases. *Acta Cytol* 2005;49:483-88.
12. Clary KM, Condel JL, Liu Y, Johnson DR, Grzybicki DM, Raab SS. Inter observer variability in the fine needle aspiration biopsy diagnosis of follicular lesions of the thyroid gland. *Acta Cytol* 2005;49:378-82.
13. Patel MM. Fine needle aspiration cytology as a first line investigation in thyroid lesions. *Natl J Med Res* 2013;3(2):106–10.
14. Unnikrishnan A, Menon U. Thyroid disorders in India: an epidemiological perspective. *Indian J Endocrinol Metab* 2011; 15(Suppl 2):78–81.
15. Parikh UR, Goswami HM, Shah AM, Mehta NP, Gonsai RN. Fine needle aspiration cytology (FNAC) study of thyroid lesions (study of 240 cases). *Gujarat Med J* 2012;67(2):25–30.
16. Kantasueb S, Sukpan K, Mahanupab P. The study of thyroid lesions and the correlation between histopathological and cytological findings at Maharaj Nakorn Chiang Mai Hospital between 2003 and 2007. *Chiang Mai Med J* 2010;49:105–10.
17. Gupta M, Gupta S, Gupta VB. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. *J Thyroid Res* 2010;2010:379051.
18. Gharib H and John RG. Fine needle aspiration biopsy of the thyroid: An Appraisal. *Annals of Internal Medicine* 1993;118:282-89.
19. Svante R Orell, Gregory F Sterrett, Darrel whitake, *Fine Needle Aspiration, Cytology*, 4th edi. 2005 : 125-64.
20. Rajesh SP, Rashmi KP, Andola SK, Viral L, Mallikarjun B. Efficacy of Fine needle aspiration cytology in Diagnosis of lesions of thyroid and histopathological correlation. *J Pub Health Med Res* 2013; 1(1)18-23.
21. Rasik H, Sharmishtha P, Piyush V, Gopal M, Piyush P. Cytology findings of the thyroid lesions with the histopathology findings correlation. *Int J Med Sci Public Health* 2016; 5(4): 642-46.
22. John BH, William AH, George C Jr. Medullary (solid) carcinoma of the Thyroid-A clinicopathologic entity. *J Clin Endocrinol Metab* 1959: 19(1):152-61.