

The Role of Fine Needle Aspiration Cytology in the Diagnosis of Thyroid Nodule

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Fine needle aspiration cytology (FNAC) has gained popularity as an effective diagnostic procedure. This study was carried out to evaluate the efficacy of the technique. One hundred and twelve patients underwent FNAC of thyroid nodules. Nine patients not operated in this study had benign cysts that were aspirated with no recurrence and cytology revealed no malignant cells. One hundred and three patients were operated and biopsy results were compared with cytology findings. The accuracy rate of FNAC was 93%, while sensitivity of this procedure was 98% and specificity was 95%. Papillary cell carcinoma was found to have higher incidence than follicular carcinoma. This study has shown that FNAC is a good complementary diagnostic procedure

Key words: Cytology technique, thyroid nodule

FNAC of thyroid gland has become increasingly popular over the last four decades since its introduction by Scandinavian workers as a first line diagnostic test for the assessment of the goiter^{1,2}. Many investigators have shown that FNAC is the single most sensitive, specific and cost effective method in the investigation of thyroid nodule. The role of FNAC is to aid in the selection for surgery of thyroid nodule that have a high probability of malignancy^{3,4,5}

Thyroid nodules are the most frequently encountered thyroid diseases. They are more common in women than in men. The incidence of thyroid increases throughout life. Most of the nodules are due to cystic change in nodular goiter or colloid cyst, while few of the solitary nodules are neoplastic. A variety of diagnostic tests have been employed to separate benign from malignant thyroid nodules. Improvement in cytologic analysis has made FNAC the best test for distinguishing between benign and malignant nodules⁶. FNAC is one of the simple, cost effective and sensitive tests in screening of the patients with thyroid nodules^{7,8,9}. The aim of this study was evaluation of the technique by cytologic-histologic comparison as well as the spectrum of thyroid in our population.

Subjects and methods

One hundred and nineteen cases underwent FNA of thyroid nodule from February 1995 to January 2001 at CMH Gujranwala. The procedure was carried out with 21G disposable needle attached to 10ml disposable syringe. After the skin was cleaned with antiseptic solution the needle was thrust into the lesion with direction of the needle perpendicular to the surface of the neck. The plunger of the syringe was retracted to create negative pressure in the syringe and needle lumen. The needle was moved back and forth several times and directed into different areas of the lesion. As soon as the material was aspirated in the needle by constant negative pressure by keeping the plunger retracted the needle was retracted

from the lesion. Needle was detached and air was drawn into the syringe. The needle was again attached and aspirate blown on the slides to make a proper smears. These were fixed with 95% alcohol and stained with Haematoxylin and eosin for microscopic examination. Positive cases were sent for surgical procedure and biopsies were taken to compare the results.

Results

Among 119 cases, there were 100 females and 19 males. The age ranged 16-74 years. In 12 patients, fluid was aspirated with complete disappearance of the cyst and cytological examination revealed no malignant cells. No recurrence was reported in 9 cases, however cysts recurred within a month in three cases and these along with 100 cases underwent thyroid operation. The results of FNAC were compared with histology of the lesions (Table 1).

Table 1.

Lesion	Cytological Diagnosis	Histological Diagnosis	False +ve	False - Ve
Papillary carcinoma	6	6	-	-
Follicular carcinoma	2	2	-	-
Anaplastic carcinoma	1	1	-	-
Follicular adenoma	28	26	-	2 follicular Ca)
Hurthle cell adenoma	1	1	-	-
Multinodular goitre	50	50	-	-
Colloid goitre	3	3	-	-
Hashimoto's thyroiditis	2	2	-	-
DeQuervain's (Granulomatous) thyroiditis	1	1	-	-
Colloid cyst (recurrent)	3	3	-	-
Suspicious	6	1 (follicular Ca)	5 (follicular adenoma)	-
Total	103	96	5	2

Histology revealed twelve malignant nodules. Thirty one cases were reported as follicular adenoma, one was Hurthle cell adenoma and the remaining fifty nine were reported as benign non-neoplastic lesions. FNAC revealed malignancy in nine, suspicious in six and benign lesions in eighty-eight patients. Two follicular carcinomas were erroneously diagnosed as follicular adenomas on FNAC. Six were reported as suspicious lesions on FNAC. Thyroidectomy revealed five follicular adenomas and one follicular carcinoma. In nine cases aspiration proved therapeutic with disappearance of cyst and no recurrence in a follow up period of six months. In seven patients, cytology was indecisive due to insufficient specimen and haemorrhagic background. The overall accuracy of FNAC in this study was 93%, sensitivity 98% and specificity was found 93% (Table 2)

Table 2.

Total number of cases positive on FNAC	103
Positive cases on histology	96
False positive	05
False negative	02
Sensitivity	98%
Specificity	95%
Overall accuracy	93%

Discussion

A thyroid nodule is a common diagnostic problem both to general practitioners and to the surgeons. The aim of FNAC of thyroid is not only to separate neoplastic from non neoplastic lesions but it is important to differentiate benign from malignant lesions because a more immediate and radical approach is instituted in malignant neoplasm, whereas if lesion turns out to be benign, surgery can be delayed. Cytology in expert hands can usually differentiate the suspicious or definitely malignant nodule.

Not only the preoperative use of FNAC has reduced the number of unnecessary thyroidectomies, but it has also uncovered many clinical unsuspected cancers that would otherwise have been followed medically¹⁰.

The sensitivity of FNAC, observed in this study is more or less equal to that reported by others^{11,12,13,14,15}. The sensitivity of FNAC for malignant and overall diagnostic accuracy has been reported to be as high as 96.7% and 98.4% respectively. In our study sensitivity was 98% while accuracy was 93%^{7,8,9,11}.

Cytological diagnosis of follicular adenomas in 28 cases was confirmed in 26 by histological examination. The two misdiagnosed cases were follicular carcinoma. The false negative report was not so high as compared to other investigators⁹. Six patients had suspicious nodules on cytological examination but histological examination revealed one follicular and five cases of follicular adenoma. This finding was in confirmity with the conclusions reached in several other studies^{15,16}. In

Frable's statistical review of the thyroid FNA literature, the false negative ranged from 0.3% to 6.4% and the false positive ranged from 0.0% to 2.5%^{17,18}. Analysis of thyroid FNAC by Blum revealed 25% false positive ranged, but included in the false positive group were patients showing cytological changes suggestive but not diagnostic for malignancy¹⁹.

Our findings about the incidence of neoplastic and non-neoplastic thyroid lesion are consistent with that of Kamal et al. In this study papillary carcinoma was found to have higher incidence than follicular carcinoma²⁰.

To conclude FNAC is a safe, quick, inexpensive and reliable method for preoperative evaluation of thyroid nodules. FNAC enables the clinician to decide for eliminate unnecessary surgery. FNAC provides a specific pathologic diagnosis in contrast to ultrasound and scientist can. FNA can be therapeutic in patients have cystic lesions. The merits of the test recommend it for routine use in the evaluation of thyroid nodules.

Conclusion

FNAC is a safe, accurate and inexpensive procedure and should be performed routinely in superficial lumps as those in thyroid for planning the nature of surgery.

References

1. Einhorn J, Franzen S. Thin needle biopsy in the diagnosis of thyroid disease. *Acta Radiol* 1962; 58: 321-36.
2. Persson PS. Cytodiagnosis of thyroiditis. A comparative study of cytological, histological, immunological and clinical findings in thyroiditis. *Acta Med Scand (Suppl)* 1968; 483: 7-100.
3. Silverman JF, West RE, Larkin EW. The role of fine needle aspiration in the rapid diagnosis and management of thyroid neoplasm. *Cancer* 1986; 57: 1164-70.
4. Suen KC, Quenville NF. Fine needle aspiration biopsy of thyroid glands. A study of 304 cases. *J Clin Pathol* 1983; 6: 1036-45.
5. Caplan RH, Wester SM, Lambert PJ, Rooney BL. Efficient evaluation of thyroid nodules by primary care provider's and thyroid specialist. *Am J Manag Care* 2000; 6: 1134-40.
6. Cotran RS, Kuman V, Collins TR. *Pathologic basis of disease* 6th ed. Philadelphia, W.B. Saunders 1999: 1140.
7. Chiu WY, Chia NH, Wan SK. The investigation and management of thyroid nodules: a retrospective review of 183 cases. *Ann acadmed* 1998; 27: 196-99.
8. Davoudi MM, Yeh KA, Wei JP. Utiligy of fine needle aspiration cytology and frozen section examination in the management of thyroid nodules. *Am JSurg* 1997; 63: 1084-89.
9. Change HY, Lin JD, Chen JF et al. Correlation of fine needle aspiration cytology and frozen section biopsies in the diagnosis of thyroid nodules. *J Clin Pathol* 1997; 50: 1005-9.
10. Stavric GD, Karansfilski BT, Kalamaras AK et al. Early diagnosis and detection of clinically non-suspected thyroid neoplasia by the cytologic method. *Cancer* 1980; 45: 340-44.

The Role of Fine Needle Aspiration Cytology in the Diagnosis of Thyroid Nodule

11. Leonard N, Melcher DH. To operate or not to operate? The value of fine needle aspiration cytology in the assessment of thyroid swellings. *Clin Pathol* 1997; 50: 1302-5.
12. Lugo VH, Ortiz VN, Irizarry H et al. Pediatric thyroid nodules; management in the era of fine needle aspiration. *J Pediatric Surg* 1998; 33: 1302-5.
13. Sami KM, Nur A, Al-Sarrag, Al Sayed M. Management of solitary thyroid nodules. A prospective study. *Int Surg* 1988; 73: 99-01.
14. Piromalli D, Martelli G, Del-Prato I et al. The role of fine needle aspiration in the diagnosis of thyroid nodules: analysis of 795 consecutive cases. *J Surg Oncol* 1992; 50: 247-50.
15. Gershengorn MC, McClung MR, Chu EW et al. Fine needle aspiration cytology in the preoperative diagnosis of thyroid nodules. *Ann Intern med* 1977; 87: 265-69.
16. Walfish PG, Hazani E, Strawbridge HTG, Miskin M et al. Combined ultrasound and needle aspiration cytology in the assessment and management of hypofunctioning thyroid nodule. *Ann Intern Med* 1977; 270-74.
17. Frable WJ. Thin needle aspiration biopsy. In: Bennington eds. *Major problems in Pathology*. Vol.14th. Philadelphia B Saunders 1983: 152-81.
18. Frable WJ, Frable MA. Fineneedle aspiration biopsy of thyroid. Histopathologic and clinical consideration. In: Fenoglio CM, Wolff M eds. *Progress in surgical pathology*. Vol.1 New York: Masson Publishing 1980: 105-18.
19. Blum M. The thyroid nodule using aspiration and cytology. *Arch Intern Med* 1984; 144: 1140-42.
20. Kamal F, Niazi S, Nagi AH, Al Jaradi M, Naveed IA. Fine needle aspiration cytology (FNAC) an experience at King Edward Medical College, Lahore. *Pak Path* 1997; 7: 21-24.