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The Study of Thyroid Hormonal Levels in Patients with Fine Needle Aspiration Cytology

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Abstract

Background: There are number of tests used to determine function of thyroid which are hormonal assays; radioactive isotopes study, nuclear scan etc. but today's most widely used and simplest test is FNAC. The FNAC, when supported by clinical methods and other investigations such as USG, serum, T3, T4, THS levels can help the physician or surgeon, to take proper decision for the management of the patient. The present study planned to correlate the cytological diagnosis wherever possible with FNAC and establish their relationship. **Aim:** The study analyse the thyroid lesions by FNAC and also correlate the cytological diagnosis hormones wherever possible and establish their relationship. **Materials and methods:** The needles, syringes, slides and fixatives are used for FNAC. The chemiluminescence thyroid function test measures the levels of thyroid hormones in FNAC encountered patients. **Results:** Out of 100 cases, only 60 cases are correlated and confirmed histo-pathologically. Out of these 60 cases, 48 cases (80%) were found to be non-neoplastic and 12 cases (20%) were found to be neoplastic lesions. **Conclusion:** There is 93% diagnostic accuracy in cytological and histo-pathlogical correlation. It can be safely used in diagnosis of most of thyroid lesion without any serious complication. There was no correlation between thyroid hormones levels and the result of FNAC. Thus thyroid function tests cannot be considered selective and specific to predict the cytological diagnosis

Keywords: Thyroid Hormone, Levels, Fine Needle Aspiration Cytology

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Introduction

The thyroid is an endocrine gland situated in the anterior aspect of root of neck. Thyroid is the first endocrine gland to develop in the embryo. It begins to form about 24 days after fertilization from a median endodermal thickening the floor of primordial pharynx.[1] The thyroid is the largest endocrine gland and shows a greater variety of disease and largest spectrum of gross and microscopic changes as compared to other endocrine glands. The follicle is the functional unit of thyroid. The follicle contains glycoprotein thyroglobulin. Para follicular or c-cells secret calcitonin the colloid stars appearing by 11 week of intrauterine life. [2]

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There are number of tests used to determine function of thyroid which are hormonal assays; radioactive isotopes study, nuclear scan etc, but today's most widely used and simplest test is FNAC.[3] The thyroid gland when enlarged is easily palpable and therefore accessible to fine needle aspiration techniques. Interpretation of the aspirate is always enhanced by clinical detail of the patient such as age, symptoms and description of the lesion.[4]

Various authors' in their studies reported that the key role of FNAC in evaluation thyroid swelling. [5,6] So FNAC, when supported by clinical methods and other investigations such as USG, serum T3, T4, THS levels, can help the physician or surgeon to take proper decision for the management of the patient.[7,8] The present study was planned to correlate the cytological diagnosis wherever possible with FNAC and establish their relationship.

Aims and Objective

1. To analyse the thyroid lesions by FNAC.
2. To correlate the cytological diagnosis and hormones wherever possible and establish their relationship.

Material And Methods

In this study total 100 cases were studied in a teaching institute over 2 years. Cytological finding were compared with histo-pathological findings wherever possible. Of total 100 cases, 35 cases (35%) did not undergo surgery in our hospital. Out of 100 cases, only 60 cases are confirmed histo-pathological and correlation could be done. So we have included only 60 cases in our study group.

Standard disposable needles (25-22 gauge) were generally recommended which gave a good material. Use of disposable needles and syringes were advocated to prevent infection. We have used 10-20 ml. Standard disposable syringes. Clean grease free dry slides were used. The smears were fixed in alcohol as a fixative for minimum of 30 minutes. Air dried slides were used for Leishman staining. Wet smears were used for pap staining. Skin disinfectant, sterile dressings; local anaesthetic was part of the procedure.

The procedure was clearly explained to the patients and informed consent was taken. This was an O.P.D. procedure. The patient was kept in a lying down position. Pillow was put under the shoulder. This makes the swelling in the neck prominent. The palpable lesion was fixed with one hand. Skin is cleaned with spirit swab and the needle is inserted into it. Blood in the syringe usually means that the aspirate is unsatisfactory. The ideal aspirate has high cell content in a small amount of fluid, a creamy consistency and remained within the lumen of needles. Thyroid aspirates were often gelatinous, semisolid or contained drop of blood and tissue fluid mixed with cells or tissue fragments. The needle was disengaged from syringe. The needle was reattached and needle contents were expelled over a numbered, dry, clean (7.5 X 2.5 cm) microscope slides and immediately put into the alcohol fixative. After fixation for half an hour, the smears were stained with H and E stain. When aspirates were bloody or contained large amount of fluid, a different method of preparation of smears were followed. The syringe was emptied swiftly and its content expelled on one to two slides. The fluid/ blood were poured on gauze pad and tissue fragments. Were identified, which were collected to prepare smears just like the bone marrow aspirates. When the aspirate was only blood it was centrifuges and sediment was used to prepare smears. Along with H-E, air dried (methods fixed) smears were stained by Lesihmans stain.

The term chemilunescence (CL) was first coined by Eilhardt Weidemann.[9] It refers to the emission of light from a chemical reaction, chiefly oxidations. Unlike fluorescence, which requires the input of light at specific wavelength for emission, CL does not require a light source for the sample to emit light in CL, no radiation is absorbed. CL refer to the emission

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of light the does not derives energy from the temperature of the emitting body. It can be represented as: Direct CL: when (I) is in excited state intermediate.
Indirect CL energy may be passed on to another species for another species for light emission to be observed. Types of CL have autonomous CL (ACL), Oxyluminescence (OXL) and Enhanced CL (ECL) Basic Component & Prerequisites are Solid phase, Tracer and Single reagent. All CL detention system was consisted the sample chamber and Signal processing method & signal output display. Advantages of Chemilunescence are high sensitivity, high linearity, and high signal to noise ratio, simplicity and reproducibility. Thyroid hormones levels T3: 0.52 -1.90 ng/ ml, T4:4.4 – 1.8 and TSH: 0.3 – 6.02

Results

In the present study, out of total 60patients, 46 were females and 14 were males in ratio of 3.28 / 1. This showed that in thyroid disease, there in clear predominance of female over males. The majority of patients presenting with thyroid swelling were in 4^{th} and 5^{th} decades. Out of total 60 cases, 48 cases were non neoplastic and 12 cases were neoplastic.

Our study showed that out of total 48 non-neoplastic cases, colloid and MNG -37 cases from the single largest group and rests were diagnosed as thyroid cyst, thyroiditis, hashimoto's thyroiditis and lymphocytic thyroiditis. Out of 12 neoplatic lesions, papillary carcinoma was most common and rest were diagnosed as follicular adenoma, follicular carcinoma and medullary carcinoma.

In present study out of 48 non neoplastic cases, T3 level was normal in 39 cases but in 9 cases T3 level was abnormal. It was increased in 6 cases out of which 5 cases were of multinodular goiter and it was of acute thyroiditis. T3 was decreased in 3 cases which were of hashimotos thyroiditis.T3 level was normal in all 12 malignant cases.

Out of 48 non neoplastic cases, T4 level was normal in 39 cases but in 9 cases T4 level was abnormal. It was increased in 6 cases out of which 5 cases were of multindoular goiter and it was of thyroiditis. T4 was decreased in 3 cases which were of hashimotos thyroiditis. T4 level was normal in all 12 malignant cases.

In this study out of 48 non neoplastic cases, TSH level was normal in 41 cases but in 7 cases TSH level was abnormal. It was increased in 5 cases. Out of which 2 were multinodular goiter and 3 were of hashimoto's thyroiditis. TSH level was normal in all malignant cases. Out of 60 cases, 49 were euthyroid, 6 were hyperthyroid and 5 were hyperthyroid. Out of 6 hyperthyroid cases, 5 were multinodular goiter and one was thyroiditis. Out of hypothyroid cases, 2 were multinodular goiter and 3 were hashimoto's thyroiditis.

Table 1: Distribution of cases in neoplastic and non–neoplastic types in study group

Types of lesion	**No. Of cases (%)**
Non- neoplastic	48 (80)
Neoplastic	12 (20)
Total	**60 (100)**

Table 2: Distribution of cases of non-neoplastic lesions in study group

Cytological Diagnosis	**No. Of Cases**
Thyroid Cyst	4
Colloid Goitre MNG	37
Thyroiditis	2
Hashimoto's Thyroiditis	3
Lymphocytic Thyroiditis	2
Total	**48**

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Table 3: Distribution of cases of neoplastic lesion in study group

Cytological Diagnosis	No. Of Cases
Follicular Adenoma	2
Follicular Carcinoma	3
Papillary Carcinoma	6
Medullary Carcinoma	1
Total	**12**

Table 4: Correlation of cytological diagnosis and T3 study group

Cytological	T3		Total
	Increase/Decrease	Normal	
Neoplastic	0	12	12
Non-Neoplastic	9	39	48
Total	**9**	**51**	**60**

Table 5: Correlation of cytological diagnosis and T4 in study group

Cytological	T4		Total
	Increase/Decrease	Normal	
Neoplastic	0	12	12
Non-Neoplastic	9	39	48
Total	**9**	**51**	**60**

Table 6: Correlation of cytological diagnosis and TSH in study group

Cytological	TSH		Total
	OR	Normal	
Neoplastic	0	12	12
Non-Neoplastic	7	41	48
Total	**7**	**53**	**60**

X^2 =3.44. P>0.05 Accuracy = 68.33 %
Sensitivity = 0 % specificity = 77.36 %
PPV 0 % NPV = 85.42 %

Table 7: Thyroid hormone T3, T4, TSH level in study group

Parameter	Mean	Standard Deviation
T3	1.29	0.68
T4	7.39	2.56
TSH	3.07	1.56

Table 8: Distribution of cases in study group according to thyroid function tests

Result of TFT s	No. Of cases
Hypothyroidism	5 (8.33)
Hyperthyroidism	6 (10)
Euthyroidism	49 (81.67)
Total	**60 (100)**

Discussion

FNAC has been accepted as a useful procedure in the Scandinavian countries as well as in Europe and USA since 1950. In our country this procedure is gradually finding foothold in

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the armoury of investigation employed by clinicians to arrive at a diagnosis. The mean age ranges from 35 to 54 years. Our finding (40.05) is consistent with most of the author's finding. Majority of cases in study group were in the 5th decade of life. Female to male ratio in our study group was 3:28:1. Our findings are consistent with Keller M et al and De Los Santos et al findings (3:9:1 and 3:50:1 respectively).[10, 11]

As seen in table 14, out of the 60 cases, 49 (81.67 %) were euthyroid, 6 (10 %) were hyperthyroid and 5 (8.33%) were hypothyroid. Out of 60 hyperthyroid cases, 5 were multinodular goiter and one was thyroiditis. Out of 5 hypothyroid cases, 2 were multinodular goiter and 3 were hashimoto's thyroiditis. Out observation supports the study by Uma Handa and Harsh Mohan et al' who studied thyroid function, tests in 120 patients. Out of which 80(66.60%) were euthyroid, 20 (20.83 %) were hyperthyroid and 15 (13%) were hypothyroid.[12] Out of 48 benign cases, T3, and T4 levels were normal in 39 cases but in 9 cases T3 and T4 levels were abnormal. It was increased in 6 cases out of which 5 cases were multi-nodulargoiter and it was of thyroiditis.

T3 and T4 levels were decreased in 3 cases which were of hashimoto's thyroiditis. T3 and T4 levels were normal in all malignant cases. Out of 48 benign cases, TSH level was normal in 41 cases but in 7 cases TSH levels was abnormal. It was increased in 5 cases, out of which 2 were multinodular goiter and 3 were of hashimoto's thyroiditis. In our study group, the mean T3 level was 1.29 % ng/dl (SD – 0.68 ng/dl). The mean T4 level was 7.39 % mg/dl (SD 2.56 mg/dl). The mean TSH level was 3.07 %pg/ml (SD 1.56 PG/ML). In this study we also tried to correlate the thyroid hormone levels with cytological and histo-pathological diagnosis. The sensitivity and specificity levels of T3, T4 and TSH levels did not correlate with the cytological and histo-pathological diagnosis. This is in accordance to the study by C.K Sang et al ' who concluded that there is no correlation between cytology and thyroid function tests.[13]

Conclusion

Out of total 100 cases, five cases were inadequate for cytological interpretation hence the inadequate rate was (5.00 %) because of technical failure. inadequate aspire and limited experience in field of aspiration biopsy techniques. The maximum number of patient was in 4th and 5th decade of life. Female significantly outnumbered males in a ratio of 3:28:1. Out of these 60 cases, 48 cases (80%) were found to be non-neoplastic and 12 cases (20%) were found to be neoplastic lesions. Out of 60 cases, 49 were euthyroid (81.67 %), 6 cases were hyperthyroid (10%), 5 cases were hypothyroid (8.33%). But there was no correlation between thyroid hormones levels and the result of FNAC. Thus thyroid function tests cannot be considered selective and specific to predict the cytological diagnosis. Thus we feel that FNAC of thyroid is a reliable. Cheap, repeated, simple and easy is OPD procedure. It can be safely used in diagnosis of most of thyroid lesion without any serious complication.

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References

1. Martin and Ellis. Fine needle aspiration cytology in the head and neck region. British Journal of plastics surgery 1989, 2: 457-451.
2. Moore persuades Jason Malley, editor Essential of Embyology and birth defects 6th Ed. New York
3. S.G Deodhare .Mrs. Suman S. Deodhare editor. General pathology and pathology of system. 6th ed. Mumbai: Ramdas Bhatkal: 1809-91. 897-899. (vol 2)

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4. Grace T Mckee. Franzen S. Zajicek J. Editor. Cytopathology, 7th ed. London: Mosby, Wolfe: 1997. 85-111.
5. Kumar P.V. Hodjati H, Monabati A, et al. Medullary thyroid carcinoma: Rare cytologic finding. Acta cytology 2000; 44: 181 – 184.
6. Ramirez, F.V, Saverri C. O, Manzona O.A Ruiz H.G. et al. Fine needle aspiration cytology of high grade muco-epidermoid carcinoma of thyroid: A case report. Acta cytology 2000; 44: 259-264.
7. Singh P, Chopra R, Calton M, et al. Diagnostic accuracy of fine needle aspiration cytology of thyroid lesion. Journal of cytology 200; 17: (3): 264.
8. Perez L.A, Gupta P.K, et al. Thyroid papillary micro carcinoma: is it really a pitfall of fine needle aspiration cytology? Acta cytology 2001; 45:341-346.
9. Wiedemann, E. Arch. Sci. Phys. Nat. 1887, 18, 565; Erlangen Phys. Med. Soc. Sber. 1888, 25; Ann. Physik.
10. Klemmi P, Joensee H. Fine needle aspiration biopsy with diagnosis of thyroid nodules. Acta cytology 1988; 32(4) 423- 437.
11. D los Santos, E, T. Rofagha S.K, et al. Cystic thyroid nodules – the dilemma of malignant lesions. Arch. Lnt. Medicine 1990; 1422-1425.
12. Umahanda, et al. Role of fine needle aspiration cytology in diagnosis and management of thyroid lesion , a study of 434 patients, Indian Journal of cytology 2008 ; 23: 13-17 .
13. C.K Sang C.S, Kigonu, L, Murchi. Correlataion between and thyroid function tests, East africam medical journal 2006; 83: 533 -539.