



ISSN: 0975-833X

RESEARCH ARTICLE

FINE NEEDLE ASPIRATION CYTOLOGY STUDY OF THYROID LESIONS

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ARTICLE INFO

Article History:

Received 20th July, 2014
Received in revised form
15th August, 2014
Accepted 04th September, 2014
Published online 25th October, 2014

Key words:

Fine Needle Aspiration Cytology,
Histopathology,
Thyroid swelling,
Navodaya Medical College.

ABSTRACT

Fine needle aspiration cytology has become an accepted and cost effective procedure for rapid diagnosis of thyroid lesions. This procedure was firmly established as an important test for the evaluation of thyroid disease and an effective test for the preoperative diagnosis thyroid nodule (Gharib *et al.*, 1993).

Objectives: 1) To study the cytological features in the thyroid lesions 2) To correlate the cytological and histopathological observation, wherever possible.

Materials and Methods: During the prospective study, 110 fine needle aspiration of thyroid was performed during a period of two years in department of pathology, Navodaya Medical College, Raichur. Cytological diagnoses were classified diagnostically, and histological and cytological correlations were determined.

Results: Out of the 110 patients studied, 100 cases were of non neoplastic thyroid lesions, 10 were neoplastic. Among non neoplastic lesions, nodular goitre (69%) and Hashimoto's thyroiditis (19.09%) and between neoplastic follicular (5.45%) and papillary carcinoma (2.84%) were the most common. In histopathological examination of non neoplastic category out of 5 cases 1 were diagnosed as follicular adenomas which were diagnosed as nodular goitre by FNAC. In neoplastic category 4 showed follicular adenoma and 2 cases as nodular goitre out of 6 which was diagnosed as follicular neoplasm in FNAC. Papillary carcinoma (3 cases) and medullary carcinoma (1 case) were diagnosed same as FNAC results.

Interpretation and Conclusion: By comparing the results of FNAC and histopathology, FNAC is considered as invaluable and minimally invasive, simple, cost effective, easily repeated procedure for thyroid lesions.

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INTRODUCTION

Thyroid nodules are a source of concern for the patients and a diagnostic dilemma for physicians (Mandreker *et al.*, 1995). The prevalence of patients with thyroid nodules ranges from 4-25%. (Leong *et al.*, 2007) The vast majority of nodules are non-neoplastic or benign neoplasms (Ko *et al.*, 2003), whereas 5-10% are estimated to be malignant nodules (Leong *et al.*, 2007). FNAC of the thyroid gland is now a well established, (Guhamallick *et al.*, 2008) most important modality (Moslavac *et al.*, 2010) and first line (Guhamallick *et al.*, 2008), preoperative and pathological (Malami and Ojo, 2006) diagnostic test, for the evaluation of diffuse thyroid lesions as well as of thyroid nodules, (Guhamallick *et al.*, 2008) as it is a rapid, inexpensive investigation. Different imaging techniques are now used for preoperative diagnosis of thyroid nodules like radionuclide scanning, high resolution ultrasonography etc.

However, rapid assessment and accurate diagnosis of fine needle aspiration smears has become increasingly popular due to the global trend in reducing health care costs. (Yang and Alvarez, 1995) Hence, this study is undertaken to evaluate the FNAC of thyroid lesions and to correlate with histomorphological features wherever necessary.

MATERIALS AND METHODS

The present study was undertaken to analyze the cytology of palpable thyroid lesions and compare them with histopathology wherever possible, to determine its diagnostic accuracy. All the patients referred to FNAC of thyroid lesions were studied prospectively for a period of two years from in Department of Pathology, Navodaya Medical College Raichur. All the patients were clinically examined in detail according to the proforma and a careful palpation of the thyroid was done to guide precisely the location for doing aspiration. Details of the procedure were explained to the patients. Aspiration was done with the patient lying comfortably in a supine position and the neck was extended with a pillow under the shoulder so as to

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make the thyroid swelling appear prominent. Under aseptic precautions 23 gauge needle was inserted into the lesion with attachment of a syringe and to and fro movement performed quickly. The materials get collected in the bore by capillary suction. The needle hub was attached to air – filled syringe and the plunger was pushed down to expel the material onto a clean, labeled glass slide. The same procedure was repeated at different sites varying from 2-6times. Air dried smears were stained with May-Grunwald-Giemsa (MGG) stain and Hematoxylin and Eosin stains, Papanicolaou staining method was used wherever necessary, after which the smears were fixed in ethyl alcohol. Whenever fluid was obtained, all the contents were aspirated using a syringe attached to the aspiration needle. Macroscopic examination of the fluid was done and then centrifuged. Smears were made from the sediment and stained by the stains described earlier. A cytohistopathological correlation and role of FNAC in thyroid lesions has been studied.

RESULTS

The present study deals with the fine needle aspiration cytology (FNAC) of palpable thyroid lesions. During the study period of two years, fine needle aspirations were done on 110 cases of thyroid. Among 110 cases who underwent FNA, 15 were biopsied subsequently and subjected to histopathological study.

Age incidence of cases in the study

Group of patients referred for thyroid aspirations ranged from 10 years to 76 years with mean age of 36.5 years. Majority of the patients were in the age group of 21-30 years (Table 1) with male to female ratio as 1:4.

Table 1. Age and sex distribution of the patients

Age groups (years)	Male	Female	Total
0-10	0	01	01
11-20	0	16	16
21-30	7	23	30
31-40	8	19	27
41-50	3	20	23
51-60	2	05	07
61-70	2	02	04
71-80	0	02	02
Total	22	88	110

Neoplastic and non neoplastic lesions

In the present study, out of 110 cases non neoplastic lesions were more common accounting to 100 (90.90%) compared to neoplastic lesions 10(9.09%). (Table 2)

Table 2. Distribution of neoplastic and non neoplastic lesions based on cytological study

S.No.	Lesions	No.	Percentage
1	Non neoplastic	100	90.90%
2	Neoplastic	10	9.09%
	Total	110	100%

Distribution of individual thyroid lesions based on cytological study

Out of 110 cases, the most common non neoplastic lesion was nodular and colloid goitre (76 cases), followed by Hashimoto's thyroiditis (21 cases), and thyroglossal cyst (3 cases). The most common neoplastic lesion was follicular neoplasm accounting to 6 cases, followed by 3cases of papillary carcinomas and 1 medullary carcinoma. (Table 3)

Table 3. Distribution of individual thyroid lesions based on cytological study

S.No.	Lesions	No. of cases	Percentage
1	Nodular and colloid goitre	76	69.09%
2	Hashimoto's thyroiditis	21	19.09%
3	Thyroglossal cyst	3	2.72%
4	Follicular neoplasm	6	5.45%
5	Papillary carcinoma	3	2.72%
6	Medullary carcinoma	1	0.90%
	Total	100	100%

Non neoplastic lesions

In the present study, among 100 non neoplastic lesions, nodular and colloid goitre were the most common lesions accounting for 76 cases (76%), followed by Hashimoto's thyroiditis 21cases (21%) and thyroglossal cyst 3 cases (3%), (Table 4).

Table 4. Distribution of non neoplastic lesions in the present study

S.No.	Lesions	No. of Cases	Percentage
1	Nodular and colloid goiter	76	76.00%
2	Hashimoto's thyroiditis	21	21.00%
4	Thyroglossal cyst	03	3.00%
	Total	100	100%

In the present study, the cytological diagnosis of colloid and nodular goitre was made in 76 cases (69.09%) out of 110 patients. Majority of these patients were females, 61cases in number (55.45%) whereas males were 15 in number (13.63%) with male to female ratio of 1:4. The age in these lesions ranged from 10 to 76 years with maximum number of cases between 31-40 years (19cases, 25%) All of them clinically presented with enlarged thyroid gland, in a euthyroid state. Aspirate in most of these cases yielded moderate to scanty blood mixed brown material, and smears cytologically showed benign follicular cells in group, sheets and as bare benign nuclei in a background of thick and thin colloid. Aspirate in few of these cases yielded 0.25-10 ml of brown/ chocolate brown fluid. Out of 76 cases cytologically diagnosed as nodular goitre, 5 cases has been subjected to histopathological examination out of which, 4 were diagnosed same as FNAC and 1 case was diagnosed as follicular adenoma.

Table 5. Age range and mean age of different studies and present studies

Authors	Age Range (Years)	Mean Age (Years)
Silverman et al. (1986)	16-79	44.8
Arvinthan et al. (2007)	26-59	46
Handa et al. (2008)	5-80	37.69±14.93
Gupta et al. (2010)	22-58	38.9
PRESENT STUDY	10-76	36.5

Table 6. Sex distribution in present study and other studies

Authors	Total Cases	Male	Female
Silverman <i>et al.</i> (1986)	295	25 (8.5%)	270 (91.5%)
Arvinthan <i>et al.</i> (2007)	110	38 (34.54)	72 (65.45%)
Chowdhury <i>et al.</i> (2008)	126	38 (30.15)	88 (69.84%)
Mahar Saeed <i>et al.</i> (2006).	125	35 (28%)	90 (72%)
Ghazaleh <i>et al.</i> (2008)	200	34 (16%)	166 (84%)
Gupta (2010)	75	6 (8%)	69 (92%)
Muhammad alam (2010)	100	13 (13%)	87 (87%)
Klemi (1991)	194	21 (10.82)	173 (89.17%)
PRESENT STUDY	110	22 (20%)	88 (80%)

Table 7. Percentage of neoplastic and non-neoplastic thyroid lesions in others studies and the present study

Authors	Non Neoplastic		Neoplastic	
	Numbers	Percentage	Numbers	Percentage
Silverman <i>et al.</i> (1986)	193	71%	80	29%
Diosdado <i>et al.</i> (1994)	193	74%	29	11%
Alum <i>et al.</i> (2010)	89	89%	11	11%
PRESENT STUDY	100	90.01%	10	9.09%

Table 8. Incidence of thyroid lesions in different studies and present study.

	Silverman <i>et al.</i> (1986)		Gupta (2010)		Nggada (2006)		Nart <i>et al.</i> (2010)		Present study 2010	
	No	%	no	%	no	%	no	%	no	%
Cytology diagnosis										
Nodular, colloid Goitre/toxic goiter	156	50.4	39	52	40	57.97			76	69.09
Hashimoto's thyroiditis	9	2.9			2	2.8	36	32.4	21	19.09
Primary hyperplasia							1	0.9		
Subacute thyroiditis					2	2.8				
Thyroglossal cyst									3	2.72
Follicular neoplasm	16	5.2	12	16					6	5.45
Follicular adenoma					7	10.4				
Follicular carcinoma					10	14.49	1	0.9		
Hurthle cell neoplasm			6	8			1	0.9		
Papillary carcinoma	2	0.6	9	12	3	4.3	47	42.34	3	2.72
Pap.ca follicular variant							17	15.3		
Medullary carcinoma	2	0.6			3	4.3	6	5.4	1	0.90
Anaplastic carcinoma					2	2.8				
Poorly diff. thyroid ca.							2	1.8		
Benign cystic lesion			6	8						
Suspected malignancy			3	4						
	185		75		69		111		110	

DISCUSSION

In the present study, age of the patients ranged from 10-76 years, with a mean age of 36.5 years. This finding correlated with a study conducted by Handa *et al.* (2008) and the mean age was lower when compared to studies conducted by Silverman *et al.* (1986). Out of 110 patients 88 cases (80%) were females and 22 cases (20%) were males. The sex distribution in this study was similar with the study conducted by Ghazaleh *et al.* (2008) whereas male cases were more than female cases in the study conducted by Arvinthan *et al.* (2007). Among the distribution of the lesions in present study, the number of cases of nodular and colloid goitre were 76 (69%) which correlated with the studies conducted by Nggada *et al.* (57.97%). Hashimoto's thyroiditis accounted to 21 cases (19.09%) in the present study, the number of which was higher when compared to the study conducted by Silverman *et al.* (2.9%). A small number of cases diagnosed as thyroglossal cyst accounted to 3 cases in this study. The cases diagnosed as follicular neoplasm in this study were 6 cases (5.45%), the quantum of which, were lower when compared to the studies conducted by Silverman *et al.* (1986) (5.2%) and Gupta *et al.* (2009) (16%). Papillary carcinoma was diagnosed in 3 cases

(2.84%) which correlated with the study conducted by (Nggada *et al.*, 2006) (3 cases, 4.3%) and almost with the study conducted by Silverman *et al.* (1986) (2 cases, 0.6%) whereas the number of cases pertaining to this diagnosis was much lower when compared with conducted by Nart *et al.* (2010) where it accounted to 47 cases (42.34%). A single case (0.9%) was diagnosed in the present study as medullary carcinoma and this almost correlated with the study conducted by Silverman *et al.* (1986) (0.2%) whereas the incidence of these lesions in our study was much lower compared to the study of Nggada *et al.* (2006) and Nart *et al.* (2010) where it accounted to 4.3% and 5.4% respectively. In present study out of total 110 cases 15 cases were subjected to histopathological correlation, 12 cases showed correlation while 3 cases were not correlated.

In the study, 76 cases were diagnosed as nodular and colloid goiter; histopathological studies were available in 5 cases. Four cases proved to be same in the tissue section. In one case because of the rich cellularity and scant colloid on smear, the

case was allowed for histopathological examination, and was finally diagnosed as micro-follicular adenoma. In the present study, 6 cases were diagnosed as follicular neoplasm on cytology. Histopathology study was possible in all 6 cases that showed 4 cases as follicular adenoma whereas 2 cases were initially diagnosed as follicular neoplasm on cytology, as the smears showed features like rich cellularity and focal micro-follicular pattern of arrangement of the cells and when compared with histopathology, these cases were diagnosed as nodular goiter. In the present study cytological diagnosis of papillary carcinoma was made in 3 cases and medullary carcinoma in 1 case. All the cases were subjected to histopathological correlation and found to be 100% correct.

Conclusion

Fine needle aspiration is an easy technique of obtaining material for cytological examination, with little discomfort to the patient. The rapidity, reliability, reproducibility and low cost of the method, are the main merits of its popularity as an accepted method for the diagnosis of various thyroid lesions. It

can be done as an outpatient procedure for proper patient management and helps in the rapid diagnosis of inflammatory, hyperplastic and neoplastic lesions. It helps to differentiate cysts from solid tumors and serves as a therapeutic procedure when a cyst is encountered and also provides psychological relief of anxiety to the patients with benign thyroid lesions. It renders help in avoiding unnecessary need for excisional biopsy in advanced disease, elderly patients or in cases where, the treatment is non surgical. It is a rapid means of configuration of recurrence of previously treated malignancy without recourse to surgery. The widespread application of this method should be fully encouraged as it fulfills a genuine medical need.

REFERENCES

- Alam M, Qureshi H, Jan QA. 2010. Accuracy of fnac as a diagnostic modality in the management of solitary of solitary thyroid nodule. *J. Med. Sci.*, 18(2):94-96.
- Arvinthan T, Banagala ASK, Gamage KJPK. 2007. Use of fine needle aspiration cytology on thyroid lumps. *Galle Medical Journal*, 12(1):25-27.
- Cibas SE. Thyroid. 2009. In: Cibas ES, Ducatman SB, editors. *Cytology: diagnostic principles and clinical correlates. 3rd ed. Philadelphia: Saunders Elsevier*, 2009. p. 255-284.
- Diosdado MA, Contreras A, Gavilan I, Jimenez LE, Giron JA, Escribano JC et al. 1997. Thyroid nodules: role of fine needle aspiration and intraoperative frozen section examination. *Acta Cytol.*, 1997; 41(3):677-682.
- Gharib H and Goellner JR. 1993. Fine needle aspiration biopsy of the thyroid: an appraisal. *Annals of Internal Medicine*, 1993; 118(4):282-89.
- Ghazaleh N, Haddadinezhad S, Jafari M. 2008. Fine needle aspiration cytology of thyroid nodules: correlation with surgical histopathology. *Terk Jem.*, 2008; 12:73-4.
- Guhamallick M, Sengupta S, Bhattacharya NK, Basu N, Roy S, et al. 2008. Cytodiagnosis of thyroid lesions- usefulness and pitfalls: a study of 288 cases. 2008; 25(1):6-9.
- Gupta M, Gupta S, Gupta VB. 2009. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of solitary thyroid nodule. [Online] 2009 Nov [2009 Feb 28]; 2010: [5 pages]. URL:<http://www.sage-hindwi.com>
- Handa U, Garg S, Mohan H, Nagarkar N. 2008. Role of fine needle aspiration cytology in diagnosis and management of thyroid lesions: A study on 434 patients. *Journal of Cytology*, 2008; 25(1):13-17.
- Klemi JP, Joensuu H, Nylamo E. 1991. Fine needle aspiration biopsy in the diagnosis of thyroid nodules. *Acta. Cytol.*, 1991; 35(4):434-38.
- Ko HM, Jhu IK, Yang SH, Lee JH, Nam JH, Juhng SW, et al. 2003. Clinicopathologic analysis of fine needle aspiration cytology of the thyroid: a review of 1,613 cases and correlation with histopathologic diagnosis. *Acta. Cytol.*, 2003; 47(5):727-32.
- Leong HT, Suen MWM, Mak SM, Poon CM, Cheung YS. 2007. Fine needle aspiration cytology of thyroid nodules-how well are we doing? *Hong Kong Med. J.*, 2007; 13(1):12-15.
- Mahar SA, Husain A, Islam N. 2006. Fine needle aspiration cytology of thyroid nodule: diagnostic accuracy and pitfalls. *J. Ayub. Med. Coll. Abbottbad.*, 2006 Oct-Dec: 18(4):26-9.
- Malami SA, Ojo B. 2006. Experience with fine needle aspiration cytology for diagnostic work up of children in Nigeria. *Journal of Cytology*, 2006; 23(4): 191-195.
- Mandreker SRS, Nadkarni NS, Pinto RGW, Meneaes S. 1995. Role of fine needle aspiration as the initial modality in the investigation of thyroid lesions. *Acta. Cytol.*, 1995; 39(5): 898- 904.
- Moslavac S, Matesa N, Kusic Z. 2010. Thyroid fine needle aspiration cytology in children and adolescents. *Coll. Antropol.*, 2010; 34(1):197-200.
- Nart D, Ertan Y, Argon A, Sezak M, Veral A, Makey O et al. 2010. Role of fine needle aspiration cytology and intraoperative diagnosis in the diagnosis of thyroid nodules. *Turk. J. Pathol.*, 2010; 26 (1):48-54.
- Nggada HA, Musa AB, Gali BM, Khalil MIA. 2006. Fine needle aspiration cytology of thyroid nodules(s): a Nigerian tertiary hospital experience. *The Internet Journal of Pathology*, 2006; 5(1):1-8.
- Silverman FJ, West RL, Larkin EW, Park HK, Finley JL, Melvin S et al. 1986. The role of fine needle aspiration biopsy in the rapid diagnosis and management of thyroid neoplasm. *Cancer*, 1986; 57:1164-70.
- Yang GCH, Alvarez II. 1995. Ultrafast Papanicolaou stain: an alternative preparation for fine needle aspiration cytology. *Acta. Cytol.*, 1995; 39(1):55-60.
