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Cytological Spectrum of Thyroid Lesions – A Study OF 415 Cases

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Abstract: *Enlargement of thyroid gland called goitre is the most common manifestation of thyroid disease. Fine needle aspiration of thyroid can be used effectively as the initial modality in the evaluation of thyroid lesions, both diffuse and nodular. According to Koss (1992), various lesions which could be encountered during FNAC of thyroid include cysts, colloid goitres, various types of thyroiditis like acute, subacute, lymphocytic (including Hashimoto's type) and benign neoplasms like adenomas. Malignant lesions include not only carcinomas viz. follicular, papillary, medullary or anaplastic type but also lymphomas and metastatic deposits. The present study was conducted on 415 patients with thyroid enlargement referred to the Department of Pathology, Government Medical College, Patiala from Rajindra Hospital, Patiala as well as adjoining private institutions between the time period of August 2006 to November 2008. The main* ***aim*** *of this study was to evaluate the importance of cytology in thyroid lesions. Out of 415 cases on cytology, 371 (89.5%) were benign while 15 (3.61%) were malignant, benign to malignant ratio being 24.7:1 Out of 371 benign cases on cytology, the most common was colloid goitre (45.3%). Out of 15 malignant cases on cytology, the most common was papillary carcinoma (46.7%)., FNAC becomes a very effective, accurate, convenient and cost effective method of diagnosing thyroid lesions. This helps the surgeons either to avoid the unnecessary surgery or properly plan for the same beforehand.*

Keywords: *FNAC, Thyroid lesions.*

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I. Introduction

Thyroid is the largest of all endocrine glands and because of its superficial location, it is the only one that is amenable to direct physical examination and biopsy[6] .Enlargement of thyroid gland called goitre is the most common manifestation of thyroid disease. Since the incidence of malignancy in thyroid lesions is only 9 per lac per year[18] , it is very important to differentiate benign from malignant lesions in case of thyroid enlargement. Fine needle aspiration of thyroid can be used effectively as the initial modality in the evaluation of thyroid lesions, both diffuse and nodular. The fine needle aspiration (FNA) method for studying the thyroid was first developed in Sweden in the Radiumhelmet hospital of Stockholm during the 1950's [7] .In India, fine needle aspiration cytology (FNAC) was first introduced at PGI, Chandigarh in early seventies followed by AIIMS, New Delhi in mid seventies[5]. Various lesions which could be encountered during FNAC of thyroid include cysts, colloid goitres, various types of thyroiditis like acute, subacute, lymphocytic (including Hashimoto's type) and benign neoplasms like adenomas. Malignant lesions include not only carcinomas viz. follicular, papillary, medullary or anaplastic type but also lymphomas and metastatic deposits[9] . Various authors have reported accuracy of FNAC in thyroid lesions in their studies ranging from 80% [10] to more than 95% [19].

II. Material And Methods

The present study was conducted on 415 patients with thyroid enlargement referred to the department of Pathology, Government Medical College, Patiala from Rajindra Hospital, Patiala as well as adjoining private institutions. FNAC was performed in all the patients. Wet smears were immediately fixed in 95% ethyl alcohol for minimum 15 minutes and then were stained by Papanicolaou staining. Dry fixed smears by air drying and fixing in methanol. These were stained with MGG stain.

III. Aims And Objectives

1. To evaluate the role of FNAC in the diagnosis of thyroid enlargement.
2. To have statistical evaluation of results especially accuracy and attempt to find pitfalls in the study and compare the results with various other studies.

IV. Observations

Table 1 showing age and sex distribution in 415 cases of the present study

Age	Total	%age	M	%age	F	%age
Upto 10	4	0.96	4	0.96	0	0
11-20	35	8.43	6	1.44	29	6.98
21-30	103	24.8	7	1.68	96	23.1
31-40	100	24.1	10	2.41	90	21.7
41-50	105	25.3	21	5.06	84	20.2
51-60	46	11.1	8	1.92	38	9.15
61-70	21	5.06	9	2.16	12	2.89
> 70	4	0.96	2	0.48	2	0.48
Total	415	100.0	65	15.6	350	84.4

Male : Female = 1:5.3

Table 2 showing results of FNAC of thyroid lesions (n=415)

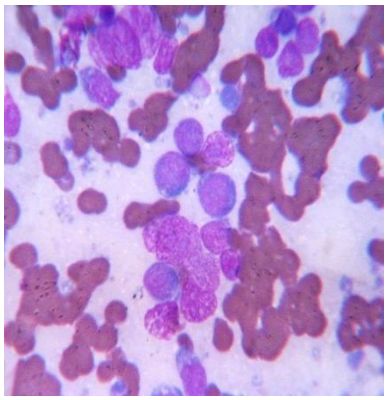
S. No.	Category		No. of cases	%age
1	Benign		320	77.2
2	Malignant		9	2.2
3	Suspicious*	Probably Benign	51	12.3
4		Probably Malignant	6	1.4
5	Inadequate		29	6.9
	Total		415	100

Table 3 showing cytological spectrum of various benign lesions (n=371) in the present study

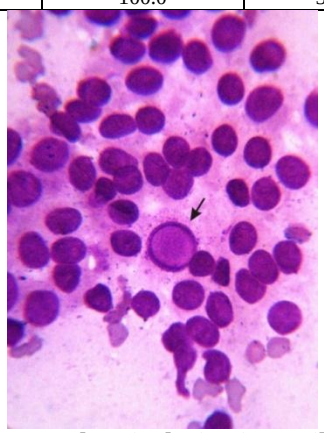
Lesion	No. of Cases	%age (out of benign)	%age of total (415)
Colloid goiter	168	45.3	40.4
Cystic degeneration	73	19.6	17.6
Autoimmune Thyroiditis	37	9.97	8.9
Colloid Cyst	18	4.85	4.3
Primary hyperplasia	10	2.69	2.4
Thyroglossal Cyst	07	1.88	1.7
Granulomatous thyroiditis	4	1.07	0.96
Acute thyroiditis	3	0.81	0.7
*Suspicious-probably benign (? follicular adenoma)	51	13.7	12.2
Total	371	100.0	89.3

Table 4 showing cytological spectrum of various malignant thyroid lesions (n=15) in the present study

Lesion	No. of Cases	%age (out of malignant)	%age of total (415)
Papillary carcinoma thyroid	7	46.6	1.69
Medullary carcinoma thyroid	1	6.60	0.24
Lymphoma thyroid	1	6.60	0.24
*Suspicious-probably malignant (? follicular carcinoma)	6	40.2	1.44
Total	15	100.0	3.61



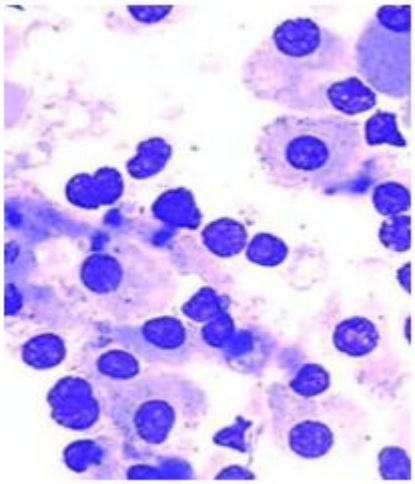
Microphotograph showing overlapping nuclei in



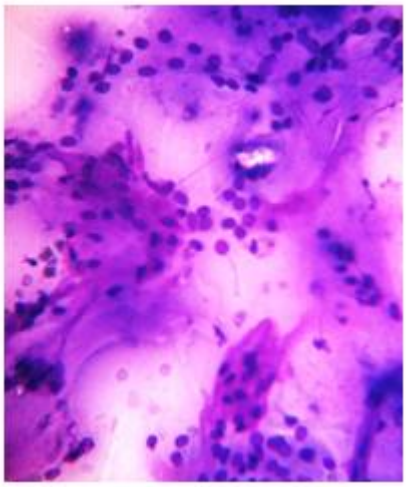
Intranuclear inclusion in papillary ca 400X

* Follicular neoplasm were kept in suspicious pathology category. Further these were divided into probably benign and probably malignant

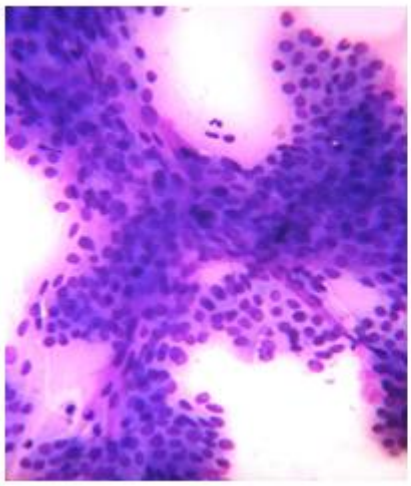
Follicular neoplasm 400X



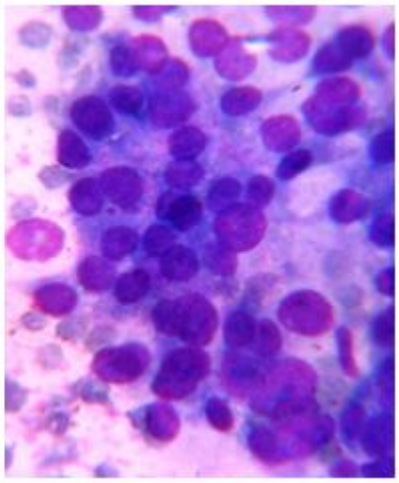
Hurthle cell change 400X



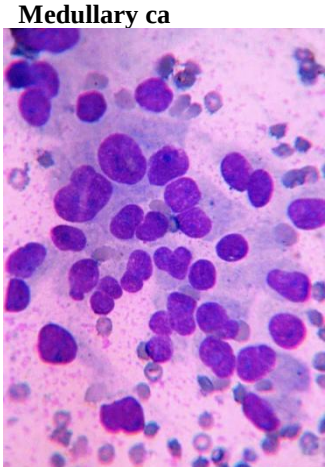
Amyloid deposition in Medullary ca 400X



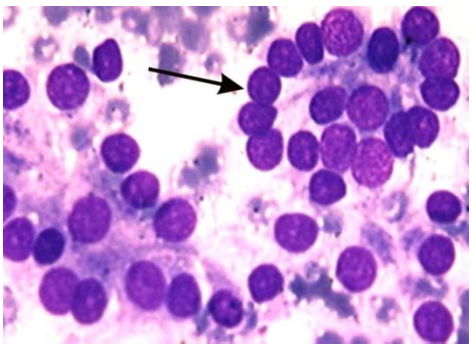
Medullary ca



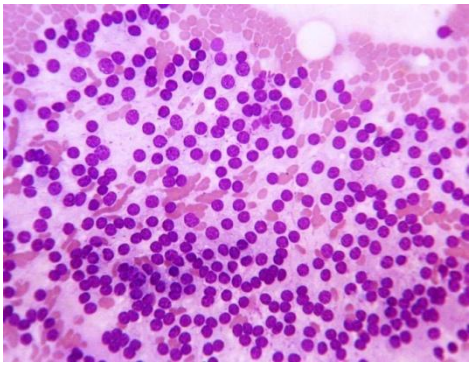
Microfollicle formation 400X



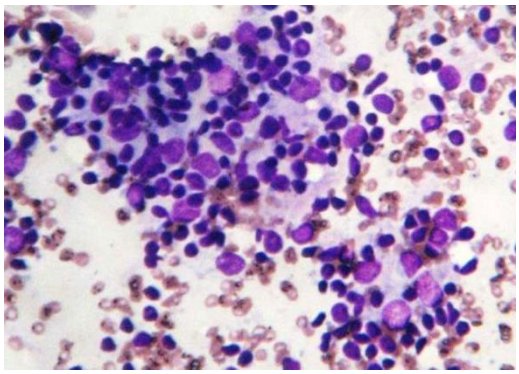
Follicular ca 400 X



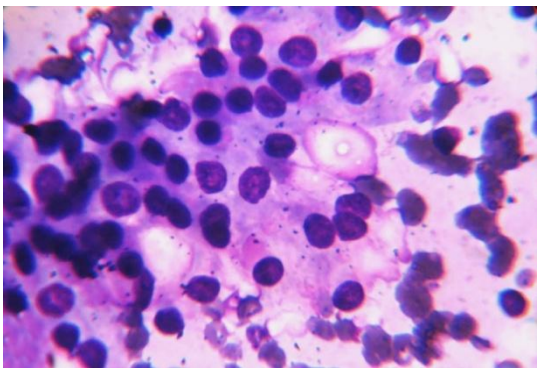
Microfollicle formation 4000X



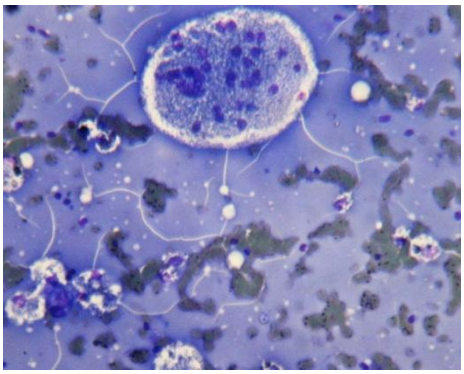
Cellular smears follicular neoplasm



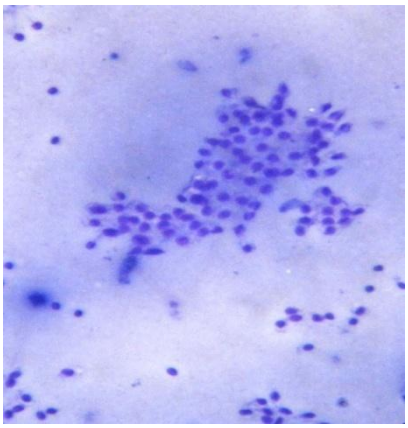
Lymphocytic thyroiditis 400X



Fire flares 400X



colloid cyst 400X



Sheet of Benign Follicular Cells In Colloid Goitre

V. Discussion

The present study was conducted on 415 cases of thyroid lesions referred to the Department of Pathology, Government Medical college, Patiala for cytological examination from Rajindra Hospital, Patiala.

Average age in the present study was 38.4 years. On cytology, in 371 cases reported as benign lesions, average age was 38.2 years while in 15 cases reported as malignant lesions, the average age was 41.7 years. Hall et al[8] reported an overall average age of 45.1 years in their study on 795 cases of thyroid lesions. Mazeh et al [12] reported an average age of 46 years in their study on 242 cases of thyroid lesions.

Sirpal et al[15] in his study on 1123 cases of thyroid lesions, observed an average age of 35.03 years. The present study with an average age of 38.4 years is more close to the study of Sirpal et al[15]; who reported a figure of 35.03 for the same.

Most of the patients were females in the present study (almost five and half times that of males). Out of 415 cases, 65 were males and 350 were females (male to female ratio being 1 : 5.3).

Mandrekar et al [11] also reported similar ratio in their study on 238 cases of various thyroid lesions. They observed male to female ratio in the tune of 1 : 6.1. Al-Rikabi et al [1]also observed male to female ratio of 1 : 5.2 in their study on 125 cases of various thyroid lesions.

Cytological Pattern of various thyroid lesions:

In the present study, the cytological pattern was in favour of predominantly benign lesions as compared to malignant lesions in a ratio of 24.7 : 1.

Out of 415 cases, 29 (6.9%) were inadequate for authentic comments in the present study.

Table 4 showing rate of inadequate smears as reported by various authors in comparison with the present study

Authors (year)	Place	No. of cases	No. of inadequate smears	Inadequacy rate (%age)
Suen & Quenville [16]	Canada	331	15	4.5%
Cap et al [4]	Czech Republic	2492	186	7.5%
Bakhos et al [3]	USA	625	43	7%
Miko et al [13]	Korea	1613	61	3.8%
Present Study		415	29	6.9%

Various authors like Suen and Quenville [16] ,Cap et al[4] , Bakhos et al[3] and Miko et al[13] have reported inadequacy rates ranging from 4.5%-7.5%.

The inadequacy rate in their study was similar to the present study viz. 6.9%.

Out of 386 cases in which material was adequate, there were a total of 371 benign lesions (371/415: 89.4%) and 15 malignant lesions (15/415: 3.61%). Thus the ratio of benign: malignant lesions was 24.7:1 in the present study.

Table 5 showing ratio of benign : malignant lesions as observed by various authors in comparison with the present study

Author (Year)	Place	No. of cases on Cytology	No. of Benign cases on cytology	No. of malignant cases on cytology	Benign : Malignant
Altavilla[2]	Italy	2433	1890 (77.6%)	32 (1.3%)	59.1:1
Mandrekar et al[11]	India	2004	1557 (78.2%)	30 (1.5%)	51.9:1
Al-Rikabi et al [1]	Saudi Arabia	479	372 (77.7%)	25 (5.2%)	14.8:1
Mitra et al[14]	India	100	87 (87%)	13 (13%)	6.69 : 1
Present study		415	371 (89.3%)	15 (3.6%)	24.7:1

Altavilla et al [2] had found the ratio of benign lesions remarkably high viz. 59.1:1 as compared to malignant lesions. Similarly the ratio of the above study was very close to the study of Mandrekar et al [11] the ratio being 51.9:1 for benign to malignant lesions.

The present study with the ratio of benign to malignant lesions viz. 24.7:1 was somewhat closer to the study of Al-Rikabi et al[1]; the ratio in their study being 14.8 : 1).

This remarkable difference in the ratio of benign to malignant lesions in the former two studies could be due to the voluminous magnitude of their studies (which included 2433 cases and 2004 cases respectively). In the present study and in the study of Al-Rikabi et al [1] the number of patients were 415 and 479 respectively), the magnitude of studies being almost 1/5th of the previous two studies

Cytological Pattern of Benign Thyroid Lesions:

In the present study, the most common benign lesion on cytology was colloid goitre (168/371: 40.4%) followed by cystic degeneration (73/371: 17.5%), follicular neoplasm-probably benign (51/371: 12.2%), auto immune thyroiditis (37/371: 8.9%), colloid cysts (18/371: 4.3%), primary hyperplasia (10/371: 2.4%), thyroglossal cysts (7/371: 1.88%), granulomatous thyroiditis (4/371: 1.07%) and acute thyroiditis (3/371: 0.81%).

Table 6 showing cytological pattern of various benign lesions as reported by various authors in comparison with the present study

Suen & Quenville [16]	Hall et al [8]	Mandrekar et al [11]	Cap et al [4]	Mitra et al[14]	Present study
Colloid goitre (42.7%)	Colloid goitre (55.1%)	Colloid goitre (62.49%)	Colloid goitre (67.6%)	Colloid goitre (45%)	Colloid goitre (40.4%)
Cystic lesions (19.4%)	-	Cystic lesions (11.05%)	Cystic lesions (17.7%)	Cystic lesions (4%)	Cystic lesions (21.8%)
Chronic lymphocytic thyroiditis (13.5%)	Chronic lymphocytic thyroiditis (7.4%)	Chronic lymphocytic thyroiditis (2.81%)	Hashimoto's thyroiditis (13.4%)	Auto immune thyroiditis (10%)	Auto immune thyroiditis (8.9%)
-	de Quervain's	-	de Quervain's	-	de Quervain's

	thyroiditis (1.4%)		thyroiditis (1.17%)		thyroiditis (1.07%)
-	Toxic goitre (0.1%)	Toxic goitre (0.70%)	-	-	Toxic goitre (2.4%)
Follicular Neoplasm (13.5%)	Follicular Neoplasm (9.5%)	Follicular Neoplasm (7.58%)	Follicular Neoplasm (9.8%)	Follicular Neoplasm (28%)	* Follicular Neoplasm (12.2%)

Out of benign lesions, the commonest lesion described by various authors was colloid goitre.

Suen and Quenville[16] observed 42.7% cases in their study as colloid goitre. The present study reported 40.4% cases as colloid goiter. Cystic lesions viz. benign cysts (like colloid cyst) or goitrous lesions with cystic degeneration were next to colloid goitre.

Suen and Quenville [16] reported 19.4% cases while Cap et al [4] reported 17.7% cases of cystic lesions. The incidence quoted by the former was more close to the present study viz. 21.8%.

Hall et al 8 observed 7.4% cases of their study as chronic lymphocytic thyroiditis. Suen and Quenville 16 and Cap et al 4 reported the figure as high as 13.5%. In the present study, the figure was in between the two (viz. 8.9%). de Quervain's thyroiditis ranged from 0.20% (as reported by Mandrekar et al11 to 1.17% (as reported by Cap et al,). Hall et al 8 observed 1.4% cases of their study as de Quervain's thyroiditis. The present study with 1.07% cases reported as de Quervain's thyroiditis was more close to the study of Cap et al4 who reported 1.17% cases for the lesion).

Follicular neoplasm (many of the studies did not mention benign or malignant lesions separately) was observed in the tune of 13.5% in the study by Suen & Quenville[16], 7.85% in the study by Mandrekar et al[11] and 9.8% in the study by Cap et al [4]

In the present study, the follicular neoplasm was in the tune of 13.6% (out of which 12.2% were probably benign and 1.4% were probably malignant)

In the present study in which 15 cases were reported as malignant on cytology, the most common malignant lesion encountered was papillary carcinoma (7/15, 46.6%), followed by follicular neoplasia-probably malignant (6/15, 40.1%), medullary carcinoma (1/15, 6.67%) and a single case of lymphoma (1/15, 6.67%).

Table showing cytological pattern of malignant lesions as observed by various authors in comparison with the present study

Hall et al[8]	**Mandrekar**	**Sirpal [11]**	**Cap et al[4]**	**Mitra et al[14]**	**Present Study**
Papillary carcinoma (8.5%)	Papillary carcinoma (1.11%)	Papillary carcinoma (0.80%)	Papillary carcinoma (2.41%)	Papillary carcinoma (10%)	Papillary carcinoma (1.68%)
Mixed carcinoma (0.9%)	Anaplastic carcinoma (0.25%)	Medullary carcinoma (0.18%)	Lymphoma (0.35%)	Medullary carcinoma (1.0%)	Medullary carcinoma (0.24%)
Anaplastic carcinoma (0.5%)	Medullary carcinoma (0.05%)	Anaplastic carcinoma (0.18%)	Anaplastic carcinoma (0.31%)	Anaplastic carcinoma (2.0%)	Lymphoma (0.24%)
Medullary carcinoma (0.2%)	Lymphoma (0.05%)	Lymphoma (0.08%)	Medullary carcinoma (0.25%)	-	*Follicular neoplasia probably malignant (1.44%)

Out of malignant lesions, the commonest lesion described by various authors was papillary carcinoma.

The present study with 1.6% of the cases reported as papillary carcinoma was more close to the study of Mandrekar et al [11] who reported 1.1% cases for the lesion.

Medullary carcinoma (0.24%) was the malignant lesion reported next to papillary carcinoma. Mandrekar et al [11] reported 0.05% cases of medullary carcinoma in their study while Sirpal[15] and Cap et al [4] reported 0.18% and 0.25% cases of the lesion respectively. The incidence quoted by the latter was more close to the present study (viz. 0.24%).

Lymphoma thyroid ranged from 0.05% (as reported by Mandrekar etal [11] 0.35% (in the study of Cap et al[4]). In the present study, the figure was in between the two (viz. 0.24%).

VI. Summary And Conclusions

Out of 500 cases on cytology, 371 (89.5%) were benign while 15 (3.61%) were malignant, benign to malignant ratio being 24.7:1 (29 smears viz. 6.9% were inadequate for authentic comments)

Out of 371 benign cases on cytology, the most common was colloid goitre (45.3%) followed by cystic degeneration (19.6%), thyroid neoplasia-probably benign (13.7%), autoimmune thyroiditis (9.97%), colloid cysts (4.85%), primary hyperplasia (2.69%), thyroglossal cysts (1.88%), granulomatous thyroiditis (1.07%) and acute thyroiditis (0.81%).

Out of 15 malignant cases on cytology, the most common was papillary carcinoma (46.7%) followed by thyroid neoplasia-probably malignant (40.1%), medullary carcinoma (6.67%) and lymphoma (6.67%).

FNAC thyroid forms a very vital and useful tool in predicting the diagnosis before hand. This not only gives important guidelines to the surgeons in avoiding unnecessary surgery, but also gives them a perfect planning to carry out the surgery

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