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A Study of Comprasion of Conventional Cytology with Liquid Based Cytology of Thyroid FNAC – A Study of 100 Cases.

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ABSTRACT

Background: Fine Needle Aspiration (FNA) cytology of the thyroid has been increasingly utilized for the investigation of thyroid lesions. FNA of the thyroid gland is considered to be most cost effective and accurate primary diagnostic procedure for thyroid nodules. In the recent years many approaches has been devised to improve the quality of thyroid FNA cytology because the conventional smear (CS) is subject to error in sample collection and slide preparation. The liquid based cytology (LBC) originally developed for the application of gynaecologic cervical smears, has progressively gained for application of both non gynaecologic and fine needle aspiration cytological material. According to the Wilcoxon signed ranked test for thyroid lesions LBC was not useful in goitre and infectious lesions. It gave better results in anaplastic and medullary carcinoma. So conventional smear is more sensitive, specific and accurate than LBC. **Methods**: in this prospective study, we had 100 cases of thyroid. In each case, two passes were performed. The first pass was for CS and the second pass yielded material for LBC. Both CS and LBC smears were compared for cellularity, background blood and necrotic cell debris, cell architecture, informative background, presence of a monolayer of cells and nuclear and cytoplasmic details and test on an for statistical analysis. **Results:** Diagnostic accuracy was better in CS compared with LBC smears as CS was most sensitive (93.18%) and accurate (91.75%) method for analysis of thyroid while LBC method is sensitive (89.04%) and accuracy (86.59%).**Conclusion**: Conventional smear is more sensitive, specific and accurate than LBC because LBC introduce more cytological artifacts to thyroid aspirates.

Keywords: Aspiration, conventional smear, liquid base cytology(LBC),anaplastic, medullary.

INTRODUCTION

Thyroid swelling is one of the most common problems encountered in clinical practice. The name thyroid is derived from the greek word Thyreoides.[1] The thyroid gland is unique among all endocrine glands in many ways. It is the largest of all endocrine gland and because of its superficial location, it is the only one that is amendable to direct physical examination, FNAC and biopsy.[2]

Enlargement of thyroid gland is called goitre is the most common manifestation of thyroid disease. The magnitude of the problem is far greater than what had estimated in 1960's, when it was estimated that about 9 millions person were affected by goitre in india.[3]

Currently no less than 140 million people are estimated to be affected in the country. In the sub Himalayan region which is considered to be largest goitre belt in the world, nearly 55 millions are estimates to be suffering from goitre, with an average goitre prevalence of 36%.[3]

Diseases of the thyroid are of great importance since most are amenable to medical and surgical management.[2] Since the incidence of malignancy in the thyroid lesion is only 0.9 per million,[4] it is very important to differentiate benign from malignant lesion in case of thyroid enlargement.

In the recent years FNAC has become the single most important test in the evaluation of patients with thyroid masses.[5] Fine needle aspiration of the thyroid gland is considered to be the most cost effective and accurate primary procedure for thyroid nodules. In the recent years, many approaches has

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been devised to improve the quality of thyroid FNA cytology, because the conventional preparation (CP) smear is subject to errors in sample collection and slide preparation. The liquid based cytology (LBC) is developed for application of gynaecological cervical smears has progressively gained consensus for both non-gynaecologic and fine needle aspiration cytological material.[6]

Proponents of conventional smears note the simplicity and lack of expense, retention of important background clues that can be lost in liquid based preparation, and the ability to display the pristine nuclear morphology needed for a definite diagnosis of papillary thyroid carcinoma.

Aims and Objective

1. To evaluate the role of Fine Needle Aspiration Cytology in diagnosis of thyroid enlargement.
2. To evaluate the comparison of conventional smear with liquid based cytology of the thyroid FNAC.
3. To have statistical evaluation of the results especially accuracy and attempt to find pitfalls in the study and compare the results with various other studies.

MATERIALS AND METHODS

The present study was conducted on patient with thyroid enlargement referred to department of Pathology, Government College, Patiala from Rajindra hospital, Patiala as well as adjoining private institutions. The study including 100 subjects attending the hospital. It was open and prospective study.

Patients were subjected to thorough physical examination with relevant history especially pertaining to symptoms of pressure and endocrine dysfunction. Provisional clinical diagnoses were made. FNAC was done. Conventional smear was prepared simuntanosly with liquid based cytology smear and stained with Romanowsky stain, Papanicoleau and May–Grunwald Gimesa stain after fixation the slide with alcohol in each case. The smears were thoroughly examined under microscope for various types of cells. Comparison of conventional and liquid based cytology smear was done. Then data was collected, complies and analysed statistically.

RESULT

The present study was conducted in the department of pathology, Government Medical College, Patiala on100 thyroid FNA cases. Conventional smears and LBC smears were prepared from each sample and results of two were compared.

Maximum number of cases 70(70%) were in age group of 20-40 years followed by 29(29%) were in the age group of 41-60 years. 1 (1%) cases were in the age group>60 years. The youngest patient was of 21 years and oldest was of 62 years of age.

Distribution Of Age Group Based On Cytological Analysis By Conventional Smear Out of 84 benign cases, 59 (84.3%) cases were seen in age group 20-40 years, 24 cases (82.8%) in 41-60 years and 1(100%)in age group of >60 years.

Out of 13 malignant cases, 8 (11.4%) cases were seen in age group 20-40 years followed by 5 cases(17.2%) in 41-60 years.

Distribution Of Age Group Based On Cytological Analysis By Liquid Based Cytology Smear:Out of 68 benign cases, 49 (70%) cases were seen in age group 20-40 years, 18 cases (62.1%) in 41-60 years and 1(100%)in age group of >60 years.

Out of 14 malignant cases,9 (12.9%) cases were seen in age group 20-40 years followed by 5 cases (17.2%) in 41-60 years.

Table 1: Distribution Of Cases On The Basis Of Cytological Analysis By Conventional Smear, LBC and final diagnosis.

Sr No.	Diagnosis	Conventinal Smear		LBC		Final diagnosis	
		No. Of patients	Percentage	No. Of patient	Percentage	No. Of patient	Percentage
1.	Colloid goitre	37	37%	28	28%	38	38%
2.	Nodular Goitre	39	39%	33	33%	45	45%
3.	Acute thyroiditis	4	4%	4	4%	4	4%
4.	Lymphocytic Thyroiditis	3	3%	3	3%	3	3%
5.	Unsatisfactory	3	3%	18	18%	-	-
6.	Granulomatous Thyroiditis	1	1%	-	-	1	1%
7.	Malignant	13	13%	14	14%	9	9%
	Total	100	100%	100	100%	100	100%

Table 2: Statistical Analysis Of Thyroid Aspiration.

Statistical analysis	Conventional	LBC
True Positive	85	65
False Positive	2	3
True Negative	7	6
False Negative	6	8
Sensitivity(%)	93.18%	89.04%
Specificity(%)	77.78%	66.67%
Positive Predictive Value(%)	97.62%	95.59%
Negative Predictive Value(%)	53.85%	42.86%
Accuracy(%)	91.75%	86.59%

Statistical analysis of 100 cases of thyroid aspiration by conventional smear, 3 cases were unsatisfactory. 4 benignlesions, 82 cases were true positive and 6 cases were false negative, 2 cases show false

positive results and 7 cases were true negative. So the sensitivity by conventional smear 93.18%, specificity was 77.78%, positive predictive value was 97.62% and negative predictive value was 53.85%. So the accuracy of result by conventional smear was 91.75%

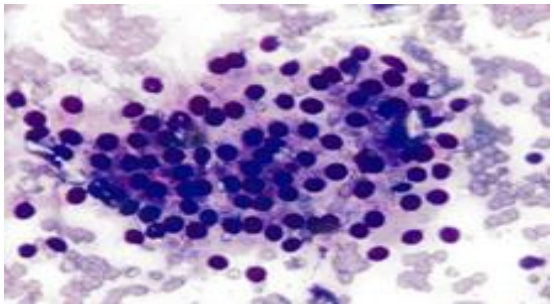

Figure 1: Photomicrograph showing sheets of benign thyroid follicular cells with hyperplastic features. (MGG 40X)

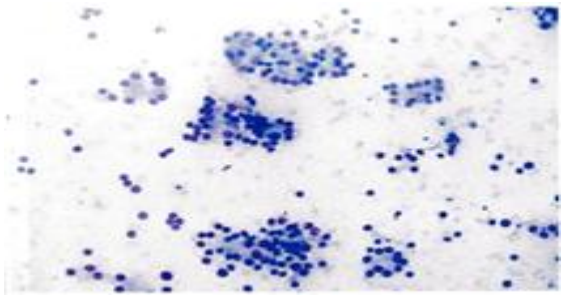

Figure 2: Photomicrograph showing monolayered sheets of epithelial cells with frayed edges, some of hyperplastic type with abundant fragile cytoplasm, some of involution type with small dark nuclei in the background of thin colloid. (MGG10X)

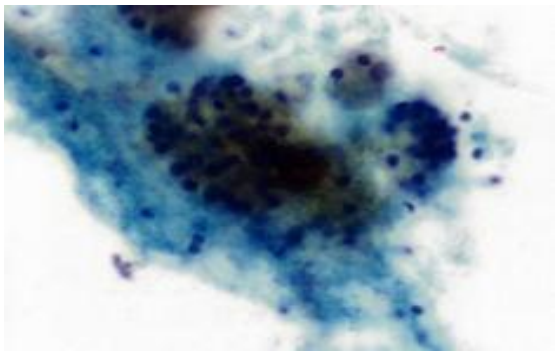

Figure 3: Photomicrograph showing sheets of thyroid follicular cells with hyperplastic features.(LBC 40X)

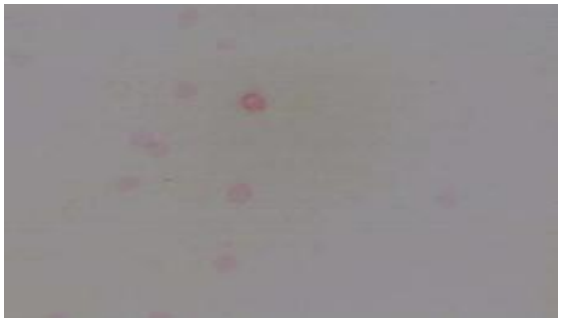

Figure 4: Photomicrograph showing only colloid droplets (LBC 40X)

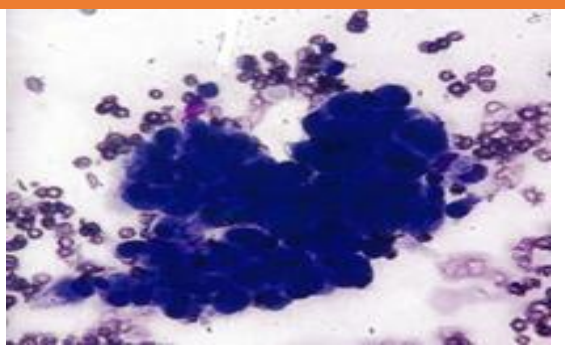

Figure 5: Photomicrograph showing flats sheets, three dimensional tissue fragments and papillary fragments. (MGG10X)

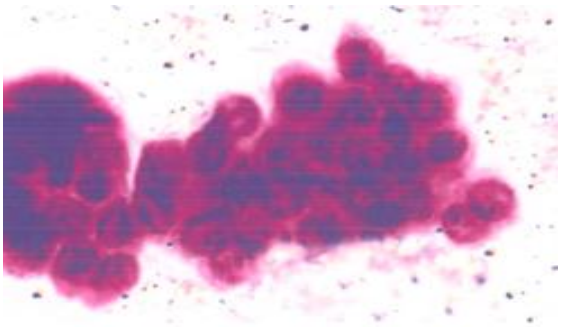

Figure 6: Photomicrograph showing papillary fragments of thyroid follicular cells. (LBC 40X)

DISCUSSION

The present study was conducted in the department of pathology, Government Medical College, Patiala on 100 thyroid FNA cases by Conventional smears and LBC smears were compared with other studies:

Age distribution

Out of 100 cases, maximum number of patients were seen in age group of 21-40 years (70%)

Table 3: Comparison Of Age Wise Distribution With Other Studies.

Author and year of study	Maximum no. of patients in age group (years)(%of total)
Rout et al [7](2011)	21-30(30%)
Mangshetty et al[8](2014)	21-40(57.27%)
Present Study	21-40(70%)

Table 4: Distribution Of Cases According To The Cause Of Thyroid Swelling

Author and year of study	Benign samples (%age)	Malignant Samples (%age)
Likhar et al[9] (2013)	94.4%	2.6%
Rao and Goyal[10](2010)	81%	19%
Mangshetty et al[8](2014)	91.37%	7.73%
Present Study	91%	9%

In the present study , maximum no. of patients (70%) were seen in age group of 21-40 years which

was comparable with the results of mangshetty et al (2014) in age group of 21-40 (57.27%).[8] In the study of Rout et al (2011),[7] however noted, 30%patients were in age group of 21-30 years.

Causes of thyroids swelling

Out of 100 cases, 91% patients were benign and 9 % patients were malignant. The results of this study was compared with other studies were as follows

In present study, 91% are benign and 95 are malignant lesions which is comparable with Likhar et al, Rao and Goyal and Mangshetty et al which is 94.4%& 2.6%, 81%&19%and 91.37%&7.73% respectively.

Table 5: Comparison Of Sensitivity And Specificity Of Present Study With Other Studies

Author and year of study	Conventional		LBC	
	Sensitivity	Specificity	Sensitivity	Specificity
Cochand-Priollet et al (2003)[11]	94%	67%	81%	60%
Kim et al(2011)[12]	100%	56.3%	100%	62.5%
Chang et al (2013)[13]	78.9%	64.2%	76.3%	54.9%
Present study	93.18%	77.78%	89.04%	66.67%

Table 6: Comparison Of Accuracy Of Conventional Smear With Other Studies.

Author and year of study	Accuracy(% age)
Rout et al (2011)[7]	96.05%
Sinha and Ezzat (2012)[14]	93.6%
Parikh et al (2012)[15]	90.24%
Manshetty et al (2014)[8]	97.56%
Present study	91.75%

Statistical evaluation was done on this study to compare the conventional smear and LBC. The sensitivity of conventional smear and LBC was 93.18% and 89.04% respectively. The Specificity of conventional smear and LBC was 77.78% and 66.67% respectively. The statistically data was comparable with other studies as Cochand-Priollet et al (2003) in which the sensitivity of conventional smear and LBC was 94% and 81% and specificity of conventional smear and LBC was 67% and 60% respectively.[11]

In Kim et al (2011) noted a sensitivity of conventional smear and LBC was 100% for both and specificity of conventional smear and LBC was 56.3% and 62.5% respectively.[12]

In the study of Chang et al (2013) sensitivity of conventional smear and LBC was 78.9% and 76.3% and specificity of conventional smear and LBC was 64.2% and 54.9% respectively.[13]

The accuracy of present study was 91.75 % which was comparable with m.....in which the accuracy was 97.56%, Sinha and Ezzat (2012) noted it was 93.6 %,[14] Parikh et al (2012) in which accuracy was 90.24% and Rout et al [7](2011)show 96.05%.[7,15]

Table 7: Comparison Of Accuracy Of Liquid Based Cytology With Other Studies.

Author and year of study	Accuracy(% age)
Stamataki et al [16](2008)	97.52%
Geers and Bourgain[17](2011)	80%
Present Study	86.59%

The accuracy of present study is 86.59% which was comparable with Geers and Bourgain (2011) in which accuracy was 80%.[17] Stamataki et al (2008) noted an accuracy 97.52%.[16]

CONCLUSION

It is thus concluded that the present study that conventional smear show more sensitivity , specificity and accuracy than Liquid based cytology as LBC introduce various artifacts to thyroid aspirates among which the most significant are loss of colloid and far less apparent intranuclear pseudoinclusions.

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