Original Research Paper

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Pathology

COMPARISON OF FINE NEEDLE ASPIRATION CYTOLOGY VS FINE NEEDLE NON ASPIRATION CYTOLOGY OF THYROID LESIONS.

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ABSTRACT **Aim:** Aim of our study was to compare the quality and diagnostic efficacy of Fine needle aspiration cytology (FNAC) with Fine needle non aspiration cytology (FNNAC) of Thyroid lesions. **Materials and Methods :-** Study was conducted on 40 cases of thyroid swelling presenting in Pathology department of MVA State Medical College, Ghazipur between July 2022 to March 2023. For every cases FNAC and FNNAC techniques were performed by single operator and smears were assessed by using five parameters, which are, background blood, amount of cellular material, degree of cellular degeneration, degree of cellular trauma and retention of architecture. **Statistical Analysis:** Data was entered into Microsoft Excel and analyzed using statistical graphpad prism 3.0. The data were presented in number/ frequency and was analyzed using Chi-square test. The differences was considered significant if the p- value less than 0.05. **Results:-** After evaluation of FNAC and FNNAC, of every cases, on the basis of these scores, it was observed that differences between background blood, degree of cellular degeneration, degree of cellular trauma and retention of architecture were statistically significant, (p-value-<0.05) while difference between amount of cellular material was not statistically significant. FNNAC yielded more number of diagnostically superior smears over FNAC while FNAC yielded diagnostically adequate material quantitatively. **Conclusion:-** FNAC and FNNAC both techniques have their own merits and demerits. By combining both the techniques better diagnostic perfection can be achieved.

KEYWORDS : FNAC, FNNAC, Thyroid

INTRODUCTION :-

In the past few decades fine needle aspiration cytology (FNAC) of thyroid has become one of the most important diagnostic test in the evaluation of thyroid lesions. In highly vascular organs like thyroid, application of suction leads to more blood aspiration and dilution of cellular material, it often results in non diagnostic smears, leading to the repetition of the fine needle aspiration procedure, which is inconvenience for patients and also causing delay in diagnosis and treatment. To overcome this problem, an alternative method of fine needle non-aspiration cytology (FNNAC) was developed in france in 1982 by Brifford et al.[1]. This study was conduct to compare the quality and diagnostic efficacy of FNAC with FNNAC in thyroid lesions.

MATERIAL AND METHODS:-

This study was conducted in department of Pathology (Cytology section) of MVAS Medical college Ghazipur. In this study group : Inclusion criteria comprised all patients who presented with thyroid swelling in the department of pathology from july 2022 to March 2023 After thorough clinical examination and full explanation about the procedure to the patients, verebal consent was obtained prior to performing procedure. Fine needle non aspiration was performed by using 23 gauge needle without attaching syringe or plunger for aspiration and fine needle aspiration was performed by 23 gauge needle with 5-cc plastic syringe for apply suction pressure. Both technique were performed by single operator. Smears are labelled A and B randomly for blinding purpose. Smear were fixed by BIO-FIX spray for 10 min, and slide were stained by using Giemsa Stain. Each smear was interpreted in a single blind setting by single pathologist and pathologist was unaware of sampling method used to avoid observer bias. Smears were scored according to the criteria using a predetermined scoring developed by Mair et al[2]. According to this scoring system, two techniques were compared by using five objective parameters:

1) Background blood or clot;
2) amount of cellular material;
3) degree of cellular degeration;
4) degree of cellular trauma;
5) retention of appropriate architecture.

Table:1-

Criteria	Quantitative description	Point Score
1. Back ground Blood/clot	Large amount; great compromise of diagnosis Moderate amount; diagnosis possible Minimal; diagnosis	0 1 2
2. Amount of Cellular material	Minimal to absent; diagnosis not possible Suffecient for Cytodiagnosis Abundant; diagnosis possible	0 1 2
3.Degree of degeneration	Marked; diagnosis impossible Moderate; diagnosis possible Minimal; diagnosis easy	0 1 2
4.Degree of cellular Trauma	Marked; diagnosis impossible Moderate; diagnosis possible Minimal; diagnosis easy	0 1 2
5. Retention of appropriate architecture	Minimal to absent: non diagnostic Moderate; some preservation of follicle, pappilae etc. Excellent; Obvious diagnosis	0 1 2

Total score obtained for both technique as between 0 and 10, which was categorized into three cateories:

- (Score 0-2)- Category 1- Unsuitable for diagnosis.
- (Score 3-6)- Category 2- Adequate for cytological diagnosis.
- (Score 7-10) Category 3- Diagnosis Superior

Statistical Analysis:

Data was entered into Microsoft Excel and analyzed using statistical graphpad prism 3.0. The data were presented in number/ frequency and was analyzed using Chi-square test. The differences was considered significant if the p- value less than 0.05.

RESULTS

Table 2 shows the baseline characteristics of the patients. The percentage of age groups ≤20 years, 21-30 years, 31-40 years, 41-50 years, and > 50 years were 20.00%, 37.50%, 17.50%, 15.00%, and 10.00%, respectively. In addition, most patients (75%) were ≤40 years of age. The percentages of male and female were 15.0% and 85.0%, respectively, with females being more commonly affected

		n	%
Age	≤20 years	7	17.50
	21-30 years	16	40.00
	31-40 years	7	17.50
	41-50 years	6	15.00
	>50 years	4	10.00
	Mean±SD	31.40±12.46	
Gender	Male	6	15.00
	Female	34	85.00

Table 3: Comparison of frequencies of scoring of background blood in between Aspiration and Non Aspiration techniques

Scoring of background blood	Aspiration		Non Aspiration		p-Value
	n	%	n	%	
Large amount (0)	7	17.50	3	7.50	<0.001*
Moderate amount (1)	26	65.00	12	30.00	
Minimal (2)	7	17.50	25	62.50	

p Value for background blood was statistically significant in favour of non aspiration technique, signifies that back ground blood in smear by non aspiration technique was less.

Table 4: Comparison of frequencies of scoring of amount of cellular material in between Aspiration and Non Aspiration Techniques:

Scoring of amount of cellular material	Aspiration		Non Aspiration		p-Value
	n	%	n	%	
Minimal to absent	4	10.00	4	10.00	0.499
Sufficient for diagnosis	21	52.50	16	40.00	
Possible diagnosis	15	37.50	20	50.00	

P value for cellular material was not statistically significant.

Table 5: Comparison of frequencies of scoring of cellular degeneration in between Aspiration and Non Aspiration Techniques:

Scoring of cellular degeneration	Aspiration		Non Aspiration		p-Value
	n	%	n	%	
Marked diagnosis impossible	3	7.50	4	10.00	0.023*
Moderate	28	70.00	16	40.00	
Minimal	9	22.50	20	50.00	

*=Significant (p<0.05)

Table 6: Comparison of frequencies of scoring of cellular trauma in between Aspiration and Non Aspiration

Scoring of cellular trauma	Aspiration		Non Aspiration		p-Value
	n	%	n	%	
Marked diagnosis impossible	3	7.50	0	0.00	0.001*
Moderate	25	62.50	12	30.00	
Minimal	12	30.00	28	70.00	

*=Significant (p<0.05)

p Value for cellular degeneration and cellular trauma was statistically significant in favour of non aspiration technique.

Table 7: Comparison of frequencies of retention of architecture in between Aspiration and Non Aspiration

Retention of architecture	Aspiration		Non Aspiration		p-Value
	n	%	n	%	
Minimal to absent diagnosis	5	12.50	3	7.50	0.014*
Moderate	22	55.00	11	27.50	
Excellent	13	32.50	26	65.00	

*=Significant (p<0.05)

P value for architecture was stastistically significant in favour of non aspiration technique, that is architecture was well retained with non aspiration technique

Table:8- Comparison of performance of FNAC and FNNAC technique:-

Diagnostic Category	Technique	
	No. of cases o FNAC	No. of cases of FNNAC
Diagnostic Superior	14	30
Diagnostic Adequate	23	7
Unsuitable for diagnosis	3	3
Total	40	40

Total 40 cases of thyroid swelling were included in study, in each case both fine needle aspiration and fine needle non aspiration technique were performed. It was observed that non aspiration technique yielded more diagnostically superior smear in comparison of aspiration technique

Table: 9- Frequency of various Thyroid lesions

Frequency of various Thyroid lesion	No. of cases	Percentage
Nodular goiter	10	25%
Colloid Goiter	8	20%
Hahimoto Thyroiditis	7	17.5%
Subacute Thyroiditis	8	20%
Follicular Neoplasm	5	12.5%
Papillary carcinoma	2	5%

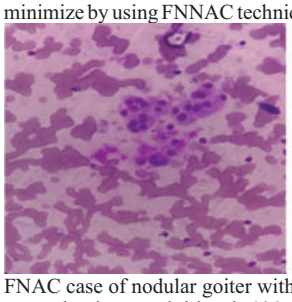
DISCUSSION:-

FNAC is world wide most widely accepeted investigation for diagnosis of palpable and non palpable thyroid lesion, very safe and sensitive, however, the major problem facing by FNAC is bad quality samples, since thyroid is highly vascular organ, yield more blood as well as poor retention of architecture, when suction pressure is applied and impairing proper diagnosis. To overcome this problem Fine needle non aspiration technique was developed and Few studies compared its effectiveness in acquiring good quality of smear to the aspiration technique.

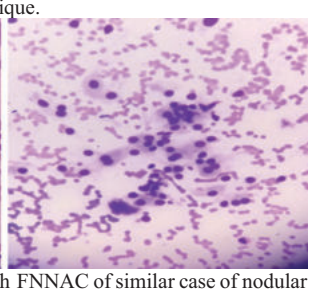
Our study purpose was compared the diagnostic quality of smear obtained by aspiration and non aspiration technique and aiming to improve the quality of thyroid cytology for better evaluation and diagnosis of thyroid nodule.

In our study total 40 patients with thyroid nodule were included between 14 year to 61 year old age. It was observed that peak incidence was found in 3rd decade Thyroid lesion are more common in female than male . Male: female ratio 1:5.4 (table-2). Similar study Kumar HC et al.[3] found peak age incidence of thyroid lesion was in 3rd and 4th decade of life and females are more commonly affected than male.

On comparision of background blood by FNAC and FNNAC technique it was observed that background blood was less by non aspiration technique. It was statistically significant (p value < 0.05) (Table-3) in favour of non aspiration technique. Similar result also by Subitha S et al[4], Ramachandra[5] study and other studies were found background blood was less with FNNAC compared to FNAC. The presence of blood cannot be prevented in thyroid lesions but it can be minimize by using FNNAC technique.



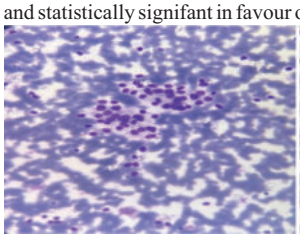
FNAC case of nodular goiter with more background blood 400x giemsa stained



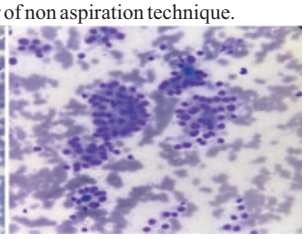
FNNAC of similar case of nodular goiter with less background blood 400x giemsa stained.

Similar to the study by Jayram and Gupta.[6] and Archana E et al,[7] abundant cellular material yeilded by FNAC technique, but in our study it was not statistically significant. Mair et al[2] also did not find any significant difference between two technique. Similar results was observed by Rodrigues and Sindhu[8] study. In contrast, Mautya A[1] study and Meherbano et al,[9] the amount of cellular material Was found to better by non aspiration technique.

Cellular degeneration and cellular Trauma was less in smears prepared by non aspiration technique in compare to aspiration technique and it was statistically significanrt in favour of FNNAC.(Table- 5 and Table-6.) similar to the Ghosh et al,[10] also showing degree of cellular degenration and cellular trauma was less in non aspiration technique and statistically signifant in favour of non aspiration technique.



FNAC of Follicular Neoplasm showing more Cellular degeneration and poor architecture. (Giemsa stained 400x)



FNNAC of same case of Follicular Neoplasm showing less cellular degeneration and better retention of architecture. (Giemsa stained 400x)

In our study, better retention of architecture in smears prepared by non aspiration technique compared to aspiration technique and it was statistically significant in favour of FNNAC.(Table-7) Similar results has been found in other studies [1,9,11]

When we analyzed the performance of both technique, in our study it was observed that diagnosis was adequate in more number of cases by FNAC, while FNNAC yielded more diagnostically superior smear in comparison of FNAC (table-8). Which was supported by other studies **1,2, 8,10,12,13**.

Diagnostic performance	Current study		Maurya etal1		Mahajan P12		Rodrigues W8	
	FNAC	FNNAC	FNAC	FNNAC	FNAC	FNNAC/FNCS	FNAC	FNNAC/FNC
Diagnostic Superior	14 (35%)	30 (75%)	20 (40.0 %)	23 (46.0 %)	30 (60%)	36 (72%)	13 (23.64%)	16 (29.1 %)
Diagnostic Adequate	23 (57.50 %)	7 (17.50 %)	12 (24.0 %)	9 (18.0 %)	12 (24%)	4 (8%)	38 (69.1 %)	34 (61.82 %)
Unsuitable for diagnosis	3 (7.50 %)	3 (7.50 %)	17 (34.0 %)	19 (38.0 %)	8 (16%)	10 (20%)	4 (7.27 %)	5 (9.1%)

CONCLUSION:-

FNNAC yielded more number of diagnostically superior smears over FNAC while FNAC yielded diagnostically adequate material quantitatively. FNNAC is simple easier to perform with better patient compliance and less apprehension. Therefore both the techniques have their own merits and demerits. By combining both the techniques better diagnostic perfection can be achieved.

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