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RESEARCH ARTICLE

A COMPARATIVE STUDY OF FINE NEEDLE ASPIRATION CYTOLOGY VS FINE NEEDLE NON ASPIRATION CYTOLOGY VS ULTRASOUND GUIDED FINE NEEDLE ASPIRATION CYTOLOGY IN THE CYTOLOGICAL EVALUATION OF THYROID LESIONS

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Abstract

Introduction: FNAC is mainly used in differentiating malignant thyroid nodules from benign nodules as the later can be followed up clinically. A modified sampling technique called fine needle non-aspiration cytology (FNNAC), has come into clinical use in recent times. To evaluate the efficacy of fine-needle non-aspiration cytology (FNNAC) with that of standard fine-needle aspiration cytology (FNAC) and USG guided FNAC of thyroid lesions as regards to cellular and hemorrhagic yield.

Methodology: Patients attending Out patient and In patient Department of General Surgery with clinically palpable thyroid swelling for a period of one year are included in this study. Patients were randomised into 3 groups_ 25 patients in each group. After a thorough clinical examination, all the patients in group 1 were subjected to FNAC. Patients in group 2 were subjected to FNNAC .Patients in group 3 were subjected to USG guided FNAC. The details of the technique of Fine needle cytology were explained to the patient and an appropriate consent was obtained from each case before performing the procedure. After subjecting patients to FNNAC and FNAC using 23 gauge needle,the samples were smeared and air dried and sent to the pathologist. Cytological evaluation and reporting was done by pathologist.

Results: Out of 50 patients, 25 patients were subjected to FNNAC & 25 patients were subjected to USG guided FNAC from thyroid lesions. The smears was scored and graded accordingly. Based on the results, it was found that superior quality smears were more in FNNAC technique, but diagnostically adequate samples are more in USG guided FNAC than FNNAC.

Conclusion: For highly vascular organs like thyroid , FNNAC is the preferred technique as there is better material with less admixture of blood. The number of superior quality smears without admixture of blood is more from FNNAC. FNAC smears although equally diagnostic, mostly produced diagnostically adequate rather than superior quality smears.

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Introduction:-

The Thyroid gland is unique among the endocrine glands because of its larger size and superficial location ,which makes it easily accessible for direct physical, cytological and histopathological examination.

In clinical practice,diseases of the thyroid gland due to developmental, inflammatory, infectious, hyperplastic, degenerative and neoplastic pathologies are prevalent. Thyroid lesions may present in the form of diffuse enlargement or solitary nodules or multiple nodules[1].

Among the various thyroid nodular lesions, incidence of malignancy is relatively low . Hence diagnostic modalities that have better ability to differentiate benign from malignant lesions and differentiate between non neoplastic and neoplastic lesions are of prime importance, based onwhich further treatment can be decided[2]

In clinical practice, FNAC is mainly used in differentiating malignantthyroid nodules from benign nodules as the later can be followed up clinically[3.] Fine needle aspiration cytology involves the aspiration of cellular material from the target masses by using high suction pressure with the help of needle and syringe. However, FNA has a disadvantage of inadequate and bloody samples as thyroid is a highly vascular organ. A modified sampling technique called fine needle non-aspiration cytology (FNNAC) , pioneered in France by Brifford et al in the 1980s has come into clinical use in recent times[6]. In FNNAC , active aspiration by syringe is replaced by the principle of capillary suction of fluid or semi fluid material into a thin channel (fine needle)thereby overcoming the problems of inadequate and bloody samples[4] . Relative to FNAC ,FNNAC is technically less painful, less traumatic and patient-friendly and the smears obtained by FNNAC are of "text book" quality. Studies in the past involving FNAC and FNNAC have been done mainly by pathologists. However, in resource limited settings of rural India with thenon availability of pathologist, the role of surgeon becomes important. Hence,we tried to compare the efficacy of FNAC with FNNAC during the evaluation of thyroid lesions , sampling being performed by single surgeon[7].

Whereas superficial lesions of thyroid are readily accessible with blind FNAC technique,deeply seated lesions are relatively difficult to be sampled adequately for accurate diagnosis for which imaging techniques like ultrasound comes into play[8].Hence in our tertiary care centre set up, we tried to analyse the efficacy of USG guided FNAC.

Aims & Objectives:-

To evaluate the efficacy of fine-needle non-aspiration cytology (FNNAC) with that of standard fine-needle aspiration cytology (FNAC) and USG guided FNAC of thyroid lesions as regards to cellular and hemorrhagic yield.

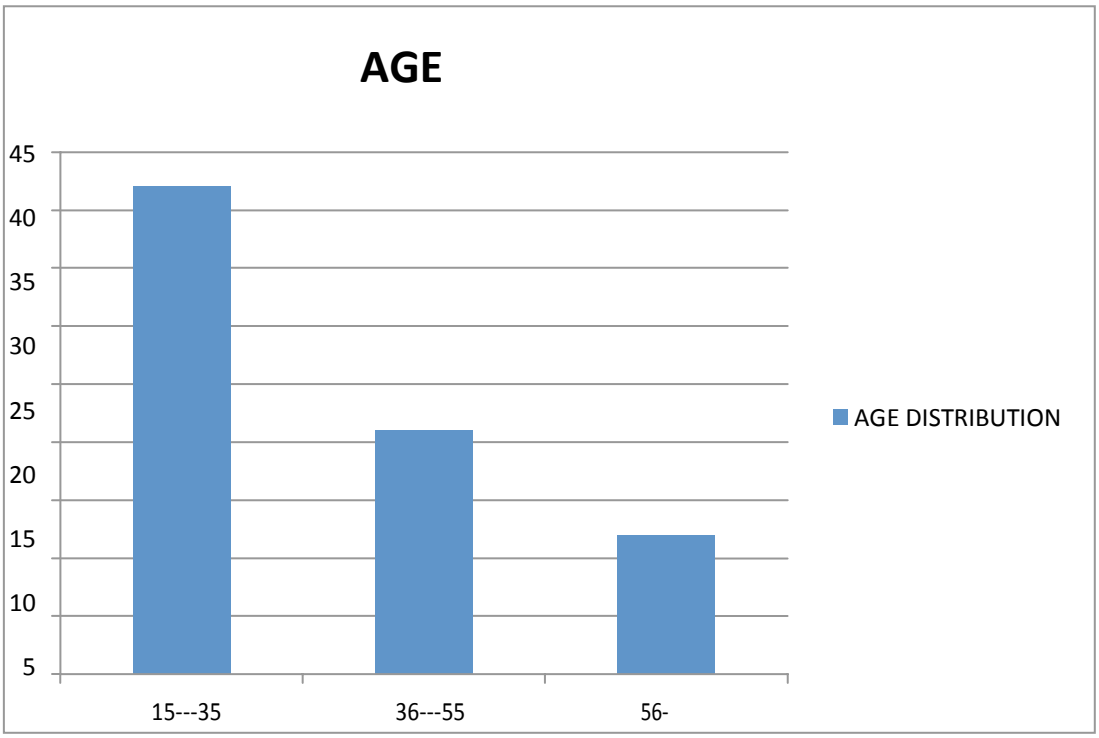
Methodology:-

Patients attending Out patient and In patient Department of General Surgery with clinically palpable thyroid swelling for a period of one year are included in this study. Patients were randomised into 3 groups_ 25 patients in each group. After a thorough clinical examination, all the patients in group 1 were subjected to FNAC. Patients in group 2 were subjected to FNNAC .Patients in group 3 were subjected to USG guided FNAC. The details of the technique of Fine needle cytology were explained to the patient and an appropriate consent was obtained from each case before performing the procedure. After subjecting patients to FNNAC and FNAC using 23 gauge needle,the samples were smeared and air dried and sent to the pathologist. Cytological evaluation and reporting was done by pathologist.

Results:-

Total number of cases studied : 75Cases subjected to FNAC:25, FNNAC: 25, USGguided FNAC: 25

SEX	**NO.OFCASES**	**%**
Total	75	100%
Male	7	9%
Female	68	91%



Distribution Of Thyroid Disease

Sl. No.	Diagnosis	No. of cases
1	Nodular colloid goiter	14(19%)
2	Cystic colloid goiter	29(39%)
3	Autoimmune thyroiditis	29(39%)
4	Follicular neoplasm	1(1%)
5	Papillary carcinoma	1(1%)
6	Medullary carcinoma	1(1%)
	Total	**75(100%)**

Comparison Betwen FNAC & FNNAC

S.NO	GRADING OF SMEARS	FNNAC	FNAC
1	Diagnostically superior	18(72%)	11(44%)
2	Diagnostically adequate	6(24%)	13(52%)
3	Diagnostically unsuitable	1(4%)	1(4%)
4	Total	25	25

Comparison Of Superior Quality Of Smear

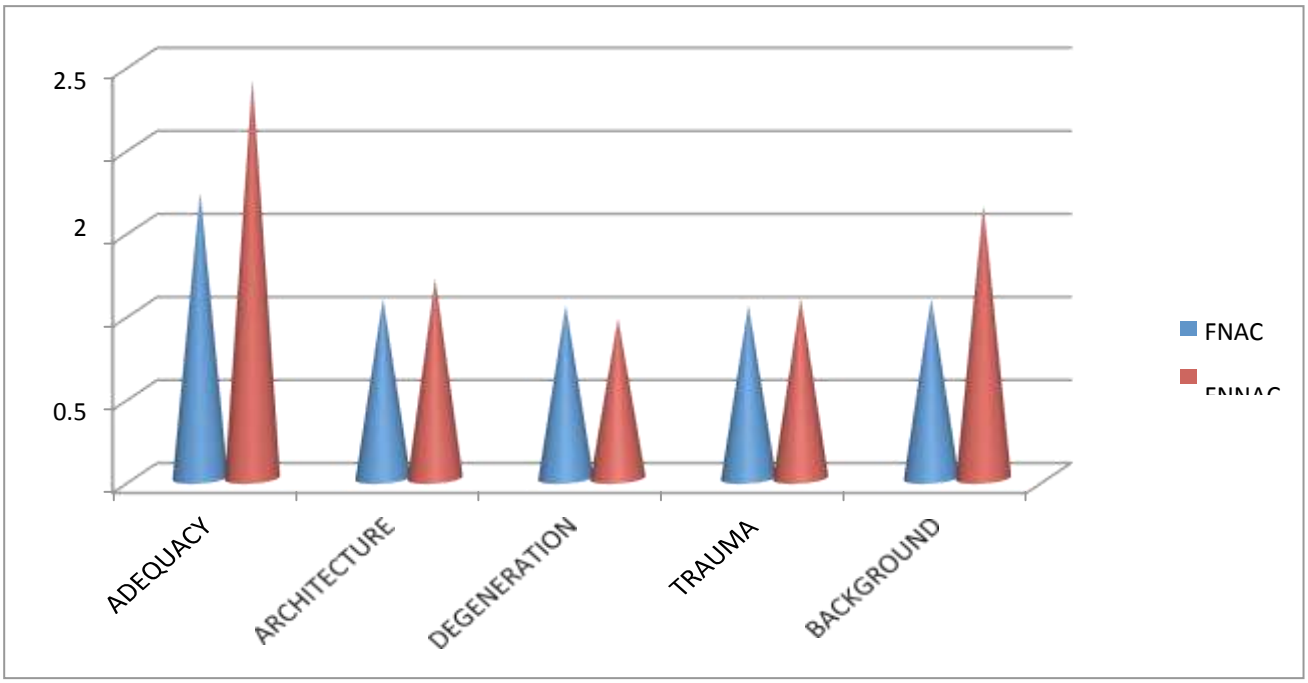
FNNAC	FNAC	Z SCORE	P VALUE
18	11	2	P<0.05

For each parameter ,the score obtained was added and an average score for each parameter was obtained in FNAC and FNNAC and tabulated. Total average score was then obtained by adding all the scoresin FNAC & FNNAC and was found to be 5.8& 6.5 respectively.

TOTAL AVERAGE SCORE		
1	FNAC	5.8
2	FNNAC	6.3

Based on the average score from each parameters in FNAC & FNNAC of thyroid lesions , it was found that FNNAC score was numerically higher than FNAC.

AVERAGE SCORES OF FNAC & FNNAC						
S.NO	**Technique**	**Adequacy**	**Architecture**	**Cellular degeneration**	**Cellular trauma**	**Background of blood**
1	FNAC	1.72	1.08	1.04	1.04	1.08
2	FNNAC	1.84	1.20	0.96	1.08	1.64



The diagnostic adequacy was equal in both FNNAC and FNAC techniques in thyroid lesions. The results of both FNAC & FNNAC for diagnostic adequacy were compared, analysed using Z test and found to be statistically insignificant , $P > 0.05$.

Comparison Of FNNAC VS USG Guided FNAC:

Out of 50 patients, 25 patients were subjected to FNNAC & 25 patients were subjected to USG guided FNAC from thyroid lesions. The smears was scored and graded accordingly. Based on the results, it was found that superior quality smears were more in FNNAC technique, but diagnostically adequate samples are more in USG guided FNAC than FNNAC.

S.NO	**GRADING OF SMEARS**	**FNNAC**	**USG GUIDEDFNAC**
1	Diagnostically unsuitable	1(4%)	0(0%)
2	Diagnostically adequate	6(24%)	13(52%)
3	Diagnostically superior	18(72%)	12(48%)
4	**Total**	25	25

By comparing superior quality smears obtained by FNNAC and USG guided FNAC , it was found that FNNAC technique produced more number of superior quality smears than USG guided FNAC and the result was found to be statistically significant [$P < 0.05$]

Comparison Of Superior Quality Smears FromBoth Techniques:

FNNAC	**USG GUIDED FNAC**	**Z SCORE**	**P VALUE**

18	**12**	**1.7321**	**P < 0.05**

By summing up all the scores , the score per case and average score for each parameter in each case were obtained and tabulated. The score for FNNAC & USG guided FNAC was found to be 6.3 and 5.9 respectively.

AVERAGE SCORES OF FNNAC & USG GUIDED FNAC						
S.NO	**Technique**	**Adequacy**	**Architecture**	**Cellular degeneration**	**Cellular trauma**	**Backgr ound blood**
1	FNNAC	1.84	1.20	0.96	1.08	1.64
2	USG guidedFNAC	1.72	1.20	1.0	1.0	1.04

The diagnostic adequacy of both FNNAC & USG guided FNAC was compared . Even though USG guided FNAC has slightly higher value than FNNAC, statistical analysis found it to be statistically insignificant.

The results were compared and analysed based on Z test and result foundto be statistically insignificant , (P > 0.05).

Discussion:-

Currently fine needle sampling is a commonly employed technique for cytodiagnosis of thyroid lesions . Malignancy in thyroid is less prevalent (3 to 5%) compared to benign lesions. Arriving at a correct diagnosis by proper utilisation of FNC can thus help in reducing diagnostic thyroidectomie[10]. The underlying principle in fine needle aspiration cytology (FNAC) involves the aspiration of cellular material from target masses by the application of suction pressure[9]. An alternative fine needle sampling technique called fine needle non aspiration cytology (FNNAC), developed in France, in which tumour cells are obtained with a thinner needle by using capillary action. In the present study ,fine needle non aspiration technique is compared to that of blind FNAC and USG guided FNAC to evaluate their efficacy. This study included the samples collected from 75 patients with thyroid swelling, 25 of which were obtained by blind FNAC, 25 by FNNAC and another 25 by USG guided FNAC. On the basis of five objective parameters which includes cellular adequacy, retention of architecture, degree of cellular trauma, degree of cellular degeneration and background blood, smears obtained by FNAC & FNNAC were scored according to a scoring system designed by Mairet el in 1989. The number of superior quality smears, total average. score , mean score for each parameter and the diagnostic adequacy were compared and analysed statistically using Z test or student's 't' test . On considering all the observations and results of each technique in thyroid ,it was found that the number of superior quality smears were more from FNNAC technique (18 Vs 11) and this difference was found to be statistically significant (P<0.05).

S.no	**Technique**	**Average score**	**Diagnostic adequacy**	**No. of superior quality smears**
1	FNNAC	6.3	96%	18(72%)
2	FNAC	5.8	96%	11(44%)
3	P value	P>0.05	P>0.05	P<0.05

The number of unsuitable smears were equal in both the techniques. On analysing the mean score under sub categories like cellular adequacy, retention of architecture, degree of cellular trauma and background blood, scores obtained by FNNAC were numerically higher than FNAC. Particularly the amount of background blood was found to be very less in FNNAC technique. On analysing the average scores , the average. score obtained by FNNAC was more than FNAC (6.3 Vs 5.8). However, the diagnostic adequacy was found to be the same with both techniques. (96%), thus conferring no statistical difference . Although this study showed no statistically significant difference between FNAC and FNNAC with respect to average scores and diagnostic adequacy, it proved a statistically significant difference in the number of superior quality smears for which FNNAC is superior to FNAC. Also, this study demonstrated the fact that background blood was less with FNNAC than FNAC. Thus, in a highly vascularised organ likethyroid, FNNAC is preferred over FNAC. However, in cystic lesions of thyroid like colloid goitre , colloid nodule, and cystic degeneration in a nodular colloid goitre, FNAC is the procedure of choice. It allows adequate drainage of fluid material and it is also therapeutic in cases of simple benign cysts. FNAC yield adequate diagnostic material in those cases. The results obtained in this study of comparison of two techniques of FNC in thyroid swelling is in concordance with the results of various studies conducted in the past.

Comparison Of The Number Of Superior QualitySmears Obtained By Fnnac & Fnac With Other Studies:

AUTHOR/ YEAR	**FNNAC**	**FNAC**	**P value**

Ali 2005	Rizvee	et	al	in	44.7%	45%	P < 0.05	
Present study					**72%**	**44%**	**P (statistically significant)**	**<0.05**

Comparison Of The Diagnostic Adequacy(%) Of Fnnac & Fnac In Thyroid Lesions With Other Studies:

Diagnostic adequacy	**FNNAC**	**FNAC**	**P value**
CV Raghuveer et al in 2002	82.4%	77.9%	p >0.05
Mitchell et al in 2007	87%	89%	p>0.05
Present study	**96%**	**96%**	**p>0.05 (statistically insignificant)**

On comparing FNNAC with USG guided FNAC , this study showed thatthe number of superior quality smears were more from FNNAC technique (18 Vs 12) and this difference was found to be statistically significant (P<0.05).

The number of unsuitable smears were none with USG guided FNAC favouring its use in cystic lesions of thyroid . On analysing the mean score under sub categories like cellular adequacy, retention of architecture, degree of cellular trauma and background blood, scores obtained by FNNAC were numerically higher than FNAC. Particularly the amount of background blood was found to be very less in FNNAC technique thus contributing to a higher average score. On analysing the average scores , the average score obtained by FNNAC was more than USG- FNAC (6.3 Vs 5.9). The diagnostic adequacy was found to be better with USG- FNAC(100% Vs 96%) but with no statistical difference .Although this study showed no statistically significant difference between USG-FNAC and FNNAC with respect to average scores and diagnostic adequacy, it proved a statistically significant difference in the number of superior quality smears for which FNNAC is superior to FNAC. Also, this study demonstrated the fact that background blood wasless with FNNAC than USG-FNAC,thus favouring FNNAC over USG- FNAC. However it is to be remembered that in cystic thyroid lesions, USG-FNAC is preferred .

S.no	**Technique**	**Averagescore**	**Diagnosticadequacy**	**No. of superior quality smears**
1	FNNAC	6.3	96%	18(72%)
2	USG -FNAC	5.9	100%	12(48%)
3	P value	P>0.05	P>0.05	P<0.05

Conclusion:-

For highly vascular organs like thyroid , FNNAC is the preferred technique as there is better material with less admixture of blood. The number of superior quality smears without admixture of blood .is more from FNNAC. FNAC smears although equally diagnostic, mostly produced diagnostically adequate rather than superior quality smears. For the cystic lesions of thyroid , FNAC is the procedure of choice as it allows adequate drainage of fluid material and is also therapeutic in some cases, thus yielding more diagnostic material. And the use of ultrasound enhances the diagnostic adequacy of FNAC by reducing the number of unsuitable smears obtained in smaller and cystic lesions[10]. However, the number of superior quality smears is significantly higher with FNNAC than USG-FNAC. Hence, the decision to use either FNNAC or FNAC may be decided on the basis of site, size and nature of lesion (solid or cystic). In conclusion, each technique has its own merits and demerits. Both the techniques can be combined to obtain a high quality materialand to lower the failure rates and ultrasound can be utilised whenever possible.

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