FNCC VS. FNAC TECHNIQUES IN CASE OF THYROID NODULE - A COMPARATIVE STUDY

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ABSTRACT

BACKGROUND

FNCC (Fine Needle Capillary Cytology) and FNAC (Fine Needle Aspiration Cytology) are two fine established techniques, for cytodiagnosis in case of a thyroid nodule, which is a rich vascular organ. Comparative study is conducted to observe merits and demerits of these techniques.

MATERIALS AND METHODS

100 patients with thyroid lump (swelling) were examined clinically, to assess the overall size and consistency of lump. Cytological procedure is performed in supine position with neck extended. FNCC was done first, followed by FNAC in each case. 4-5 slides prepared for both modalities of cytological technique and were then stained appropriately.

RESULTS

Out of 100 patients, 91 were female and 9 were male. 58% of patients were in the age group of 21-40 yrs. Colloid goiter was the commonest lesion accounting for 52% of cases. Diagnostic adequacy of sample was found to be nearly same in both FNCC and FNAC techniques. FNCC was found to be diagnostically superior in case of malignant lesion. Cytological smears in case of FNAC was found to be more adequate but with a haemorrhagic background.

CONCLUSION

FNCC technique is safe, easy and patient friendly. Diagnostically both techniques show equivalent results. In case of highly vascular lesion it is advisable to perform FNCC to establish the cytodiagnosis.

KEYWORDS

FNCC, FNAC, Thyroid nodule.

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BACKGROUND

FNAC (Fine Needle Aspiration Cytology) and FNCC (Fine Needle Capillary Cytology) have always played an important role in diagnosing various type morphological pathology in case of a thyroid nodule. Thyroid gland is one of the most responsive endocrine gland in the body, which regulates our metabolism. The present scenario of thyroid disease in India is alarming. It has been estimated that about 42 million people in India suffers from thyroid diseases.[1] With this much bulk of disease it is need of time to explore more convenient, fast, accurate, OPD based and patient friendly approach to diagnose various morphological diseases of a thyroid swelling. Thyroid gland is superficially placed thus doesn't require USG or CT guided assistance making the procedure even easier and time saving. As the name suggest FNAC is a simple method based on removal of cells from a lesion with a fine needle (21-23 gauge) attached to a syringe to create negative pressure (aspiration). FNCC is a technique similar to FNAC which eliminates the need for aspiration by syringe and rely more on capillary action to get better cell yield to establish a cytodiagnosis precisely. It is suggested that FNC sampling by elimination of negative pressure decreases the dilution of cells by haemorrhagic background.[2] Simplicity of FNCC combines with adequacy of material made it popular enough to be adopted not only for thyroid but also for other organ like lymph nodes, peri-orbital lump[3] and breast etc.

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MATERIALS AND METHODS

The present study was conducted in Government Medical College, Bhopal. 100 patients were taken in the study group. The patient was examined clinically, characteristics of mass lesion was determined which include location, relation to other adjoining structure, depth, and consistency. The procedure was performed in supine position with neck in extended position so that thyroid lump to become more obvious and easily assessable for the procedure. FNCC was performed first, followed by FNAC in each case.

FNCC- 23-gauge, disposable needle was taken, needle is moved to and fro in different direction at different depth of the mass lesion and in different direction confined within the mass. As soon as material appeared in the hub of the needle, the procedure was stopped. Needle was then removed from the lesion and 20 ml syringe filled with air is

then attached with FNCC needle, material was then expressed gently on the slides without splattering. Slides were prepared and stained with Papanicolaou stain.

FNAC- 23-gauge, disposable needle with a 20 ml syringe was taken, the plunger of the syringe was withdrawn maximally to create aspiration (negative) pressure, needle is moved to and fro in different direction at different depth of the mass lesion and in different direction confined within the mass. As soon as material appeared in the hub of the needle, aspiration was stopped. Piston was released to equalize the pressure and then only needle was taken out of the mass lesion. Needle containing aspirate (sample) was detached from the syringe. Syringe was then filled with air by retracting the piston, needle containing aspirate material was then reattached to syringe, and material was then expressed gently on the slides without splattering. Smears are immediately fixed in 95% ethyl alcohol for Pap staining. Interpretation of smears – All smears were read by single observe and smears were divided into different categories.

These Categories are-

1. Diagnostic Inadequate - Include samples from which diagnosis was not possible. Sample obtained only blood, necrotic material and scanty cells.
2. Diagnostic adequate-Include sample having adequate cellularity and morphology of cells were clear.
3. Diagnostic superior - Included samples of good cellularity, clear morphology and unobscured by blood or necrotic material.

Aims and Objectives

This study was conducted to compare the performance of the two techniques Aspiration (FNA) and Non-Aspiration (FNCC) in thyroid lesions as regards.

1. Ease of Operation
2. Diagnostic Adequacy
3. Cytological Quality
4. Utility of FNCC in thyroid lesions
5. Establishment of FNCC

Statistical Analysis

In order to know whether the difference between performances of two techniques was significant and to know the extent to which two techniques agreed with each other, statical analysis was performed. We applied kappa statistics described by Fliess[4] (1981). Kappa statistic which will tell us to what extent does the agreement between two techniques exceed the level of agreement resulting just by chance.

% observed agreement – % agreement expected by chance alone.

$$K = \frac{\%\ \text{observed agreement} - \%\ \text{agreement expected by chance alone}}{100\% - \%\ \text{agreement expected by chance alone}}$$

In this formula 100% represent full agreement.
Kappa - 75% < = Excellent agreement between FNAC & FNCC Hence FNA can be replaced by FNCC.
Kappa - 40%-75% = Good agreement.
Kappa - 40%> = Poor agreement.

For statistical comparison of the performance by two technique, 3 x 3 table was charted which gives 9 different combinations of the performance of two technique indifferent cases.

FNAC		FNCC		
		1	2	3
1.	Inadequate	Inadequate	Adequate	Superior
2.	Adequate	Inadequate	Adequate	Superior
3.	Superior	Inadequate	Adequate	Superior

Table 1

It must be stressed that this analysis does not indicate which of the two technique is superior. It give us an indication of the level of agreement between the two technique.

RESULTS

The present study comprises of 100 patients of thyroid lesion. Out of 100 cases 91 % were female and 09% were male. Majority of patients (58%) were of 21 to 40 years of age. 10% are under 20 yrs. 18% were from 41 to 50 yrs of age. 10% of 51 to 60 yrs. >60 yrs are 4% of cases.

Cytological finding & disease pattern in the study-

- 52% colloid goiter
- 25% follicular adenoma
- 8% papillary carcinoma
- 4% lymphocytic thyroiditis
- 3% toxic nodule
- 3% Hashimoto's thyroiditis
- 2% thyroglossal duct cyst
- 1% de Quarence disease
- 1% follicular carcinoma
- 1% undifferentiated carcinoma

Majority of benign lesion (24%) were in age group of (21-30) yrs. Out of 100 cases 90% were diagnosed cytologically as benign lesions. Follicular adenoma constituted of 25%.

Definition Criteria

Diagnostic inadequate- This category include specimen from which it is not possible to give any firm opinion. A smear consists of blood, necrotic material and scanty cells.

Diagnostic adequate- This category include specimen from which we could give a diagnosis. Smear in which we have obtained adequate cellularity and morphology was clear.

Diagnostic superior- This category include specimen with high cellularity, cell groups were concentrated and cell morphology was clear.

Performance Criteria	FNAC	FNCC
Diagnostic Superior	7.7 %	30.76%
Diagnostic Adequate	75.38 %	53.84%
Diagnostic Inadequate	16.92%	15.4%

Table 2. Performance of FNAC & FNCC in Benign Lesions (90 Cases) (Statistical Analysis)

Performance Criteria	FNAC	FNCC
Diagnostic Superior	10%	60%
Diagnostic Adequate	80%	40%
Diagnostic Inadequate	10%	0

Table 3. Performance of FNAC vs. FNCC in Malignant Lesions (10 Cases) (Statistical Analysis)

Performance Criteria	FNAC	FNCC
Diagnostic Superior	9%	45%
Diagnostic Adequate	77.5%	47%
Diagnostic Inadequate	13.5%	8%

Table 4. Performance of FNAC vs. FNCC in All Cases (100) (Statistical Analysis)

DISCUSSION

Thyroid diseases are supposed to be one of the leading causes of morbidity around the globe.[5] Almost one third of world population lives in iodine deficient region,[6] which also accounts for cytological diagnosis of 52% colloid goiter cases in the present study. Thyroid nodule may be detected because of the obvious location of thyroid gland on anterior aspect of neck; it is also because of clinical skill of examining physician or surgeon. USG is a screening tool with the demerits of unnecessary pursuits of finding which has no clinical relevance particularly in case of benign tumours of thyroid. USG finding may be of more significance in case of malignant neoplasm. FNAC is established as investigation of choice in a case of thyroid nodule, because of its high degree of sensitivity and specificity.[7]

In the present study, FNAC & FNCC were performed to compare the result of each technique in establishing the diagnosis in a case of thyroid nodule. In comparing both the techniques, in majority of cases, FNCC has less haemorrhagic background on the smear stained with adequate or superior diagnostic smear.[8] FNCC was diagnostically superior in obtaining highly cellular smear, although FNAC can able to diagnose most of the lesions.

When we compare the result of benign lesion as depicted in table 2. Result of both FNAC Vs FNCC are nearly same in establishing a diagnosis FNAC scored 83% whereas, FNCC scored 84.6% when diagnostic superior and diagnostic adequate percentage were combined. Although diagnostically superior smears were better in case of FNCC (FNAC- 7.7% Vs FNCC 30.76%).

When it comes to diagnose a malignant lesion FNCC definitely has shown better results[9,10] as depicted in table - 3. Out of 10 cases of malignant thyroid nodule in the present study, FNCC could able to diagnose all the 10 cases, whereas FNAC was able to reach to a conclusion in 9 out of 10 cases. Secondly in case of FNCC, in 60% of cases, we obtained diagnostically superior smears, whereas in case of FNAC in only 10% of cases we obtained diagnostically superior smears.

When we combined, the result of both benign as well as malignant thyroid nodule (table – 4), it has been observed that diagnostically superior smears were better in FNCC arm (FNCC – 45% Vs. FNAC 9%). When it comes to establish a diagnosis in a thyroid nodule both techniques has shown nearly equivalent result (FNAC – 86.5% Vs. FNCC – 92 %).

FNAC is more useful in case of a cystic lesion, since aspiration helps in draining the cystic fluid and then cytology can be done by centrifuging the cystic fluid to enhance cellularity in smear prepared. FNAC also plays the role of therapeutic aspiration of a cystic lump. The cellular trauma and degenerations were generally the same in both techniques as these parameters depended on the methods of smear making. Sanjeev et al conducted a similar study on lymph node lesions and the results proved the technical superiority of FNCC technique in cellular lymph node lesion.[8] Though there was no significant between the two techniques if done in tandem at two different sites on the same lesion, they can add up to ease the diagnosis.[11,12]

CONCLUSION

The study was done to know whether the technique FNCC gives qualitative and quantitative superior cytologic material from thyroid lesions as compared to conventional FNAC. When 100 cases are considered, FNAC give 11% diagnostically superior, 71% diagnostically adequate and 13% diagnostically inadequate, whereas FNCC gives 44% diagnostically superior, 47% diagnostically adequate and 10% diagnostically inadequate. The combined use of FNAC & FNCC reduces the failure rate to 5% only. To conclude advantage of FNCC are as follows-

- FNCC is safe, easy to perform.
- FNCC gives better control over the procedure by providing good grip; it is excellent for small nodules. It provides better appreciation of consistency of nodule.
- Additional advantage of FNCC is that, patient discomfort is minimum when negative pressure of FNAC is eliminated. There is significant reduction in trauma to nodule and surrounding tissue making the repletion of procedure possible in case of negative results.
- FNCC gives diagnostically superior smears, irrespective of tumour, be it benign or malignant.
- FNCC sample from thyroid lesion are as good as FNAC for the diagnosis of individual case.

Recommendations

We recommend that, the two techniques would be combined for obtaining good quality cellular material to obtain a cyto-diagnosis.

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