

## FNAC and FNNAC in Thyroid Lesions: A Comparative Study

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### Original Research Article

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**Abstract:** To compare the two techniques namely fine needle aspiration and fine needle non aspiration cytology in thyroid lesions. The present study was undertaken to compare the two techniques namely fine needle aspiration and fine needle non aspiration cytology in 92 cases of thyroid aspirates which included thyroiditis, colloid goitre, follicular neoplasm and papillary carcinoma. Mair et al point scoring system was used to score the aspirates. The number of thyroid lesions sampled was 92. Out of these 40 cases (43.47%) were colloid goitre, 2 cases (2.10%) de-Quervain's thyroiditis, 18 cases (19.56%) chronic lymphocytic thyroiditis, 22 cases (23.91%) follicular neoplasm, 8 cases (8.6%) of papillary carcinoma and including 2 cases of follicular neoplasm/cellular phase of multinodular goitre. In all thyroid lesions, the non-aspiration technique showed statistically significant superior results to aspiration technique in the parameters, amount of cellular material, cellular trauma. In the present study, superior quality material was seen in more number of non-aspiration samples than in aspiration samples with less cellular trauma.

**Keywords:** FNAC, thyroid, head and neck.

### INTRODUCTION

Cells make up the basic structural unit of the human body. Study of cells, is therefore helpful not only in understanding the normal structure but also in analysing various disease processes. Study of cells as a diagnostic means, first started with the study of normally exfoliated cells. This was later extended to study of cells aspirated with the help of a needle attached to a syringe that exerted a negative pressure to disentangle the cells.

The technique of fine needle aspiration cytology (FNAC) has undergone various modifications over a period of time. It was thought to cause cell trauma, altering the cell morphology. It also lead to bloody aspirates in highly vascular organs like thyroid. This lead to the development of fine needle sampling without aspiration, called as fine needle non aspiration cytology (FNNAC). But, will the fine needle non aspiration technique yield adequate material for a cytologic diagnosis was the question in doubt.

### MATERIALS AND METHODS

A total of 92 cases were studied. These patients presented with swellings in the Thyroid lesions at Prathima Institue of Medical Sciences , Karimnagar. Relevant clinical details including the site and size of the swelling, duration since onset, signs and symptoms associated with the swelling and other investigations done were noted in a proforma prepared for this study.

After obtaining the consent, patients were first subjected to fine needle non-aspiration cytology followed by fine needle aspiration cytology. Two to 4 needle passes were done for each of the 2 techniques. Slides were labelled separately for each of the techniques before smears were made. In each technique few of the slides were immediately fixed in ether alcohol and the rest were air dried. The airdried slides were fixed in methanol for 30 min. and stained with May Grunwald Giemsa stain. The other slides were fixed in ether alcohol for 30 min and later stained with Papanicolaou stain. Ziehl-Neelsen stain was done wherever tuberculosis was suspected

### Procedure

#### Fine Needle Non-Aspiration cytology

The procedure was carried out under strict aseptic precautions. The swelling to be sampled was firmly fixed with one hand. With the other hand a needle of 23-25 gauge, held directly between finger tips, was introduced into the swelling. The needle was

moved back and forth being angled in different directions and at different depths. It was withdrawn, connected to a disposable 10ml syringe filled with air and the material was expelled onto the glass slides. Using another glass slide smears were made by applying gentle and uniform pressure. In cystic lesions when fluid material appeared at the hub of the needle, the procedure was abandoned, needle was withdrawn and aspiration technique was followed.

**Fine Needle Aspiration Cytology**

After the non-aspiration technique, another needle of 23-25 gauge attached to a disposable 10ml syringe was introduced into the swelling. The piston of the syringe was withdrawn to create negative pressure. The needle was moved back and forth in different directions and at different angles. The negative pressure was released before withdrawing the needle with the

syringe. The syringe was disconnected from the needle, air filled into it and reconnected to the needle to expell the material onto the glass slides. Smears were made as explained above. The smears were stained with PAP and MGG.

**Materials & Methods**

The smears made by both FNAC and FNNAC techniques were analysed for quality, using predetermined point scoring system developed by Mair *et al.* The two techniques were compared for amount of cellular material, background blood or clot, retention of appropriate architecture, degree of cellular degeneration and degree of cellular trauma. For each of these criteria, smears were given a score of 0-2. The total score was calculated, which varies from 0-10.

**RESULTS**

**Table-1: Frequency of Various Thyroid Lesions**

Cytology Diagnosis	No.of Cases	% of cases
Goitre	40	43.47
Chronic lymphocytic thyroiditis	18	19.56
Goitre/chronic lymphocytic thyroiditis	2	2.10
de-Quervain’s thyroiditis	2	2.10
Follicular Neoplasm	22	23.91
Papillary Carcinoma	8	8.6
Total	92	100

The number of thyroid lesions sampled was 92. Out of these 40 cases (43.47%) were colloid goitre, 2 cases (2.10%) de-Quervain’s thyroiditis, 18 cases (19.56%) chronic lymphocytic thyroiditis, 22 cases (23.91%) follicular neoplasm, 8 cases (8.6%) of papillary carcinoma and including 2 cases of follicular neoplasm/cellular phase of multinodular goitre.[Table 1]

**Colloid Goitre**

It was the commonest thyroid lesion. It accounted for 40 out of 92 (43.47%) thyroid lesions aspirated. Colloid goitre consisted of follicular epithelial cells arranged singly and in clumps. These cells are round with scanty cytoplasm and centrally placed round regular nuclei. Background showed abundant colloid. In goitre with cystic degeneration, plenty of macrophages in addition to the above findings were seen.

**Table-2: Total and Average Scores in Colloid Goitre**

Criteria	FNAC		FNNAC	
	Total Score	Average score	Total Score	Average score
Background Blood	40	1	42	1.05
Amount of cellular material	50	1.25	65	1.62
Retention of Architecture	55	1.37	60	1.5
Cell degeneration	35	0.87	45	1.12
Cellular Trauma	40	1	50	1.25
Cumulative Score	220	5.5	262	6.55

**Background Blood or clot**

It was more in aspiration smears than in non-aspiration smears. The total score in FNAC was 40 and in FNNAC 42. Their average scores were 1 and 1.05 respectively.

**Amount of Cellular Material**

The total and average scores were 50 & 65 and 1.25 and 1.62 respectively for FNAC & FNNAC smears.

**Retention of Appropriate Architecture**

The total score in FNAC was 55 and in FNNAC 60. The average scores were 1.37 in FNAC and 1.5 in FNNAC.

**Amount of Cellular Degeneration & Cellular Trauma**

The total score in FNAC was 35, 40 and in FNNAC 45, 50. The average scores were 0.87, 1 and 1.12, 1.25. In FNNAC all the cases had maximum score. The average cumulative score for FNAC was 5.5 and FNNAC 6.55. [Table 2]

**THYROIDITIS**

There were 22 cases of thyroiditis in our study of which 2 were de-Quervain’s thyroiditis and 18 were chronic lymphocytic thyroiditis. Smears from de-Quervain’s thyroiditis showed good number of follicular epithelial cells arranged in follicles and singly, few epithelioid cells and giant cells. Background contained colloid and macrophages. Chronic lymphocytic thyroiditis showed follicular epithelial cells and good number of lymphocytes, few lymphoblasts and plasma cells.

**Table-3: Total and Average Scores in Thyroiditis**

Criteria	FNAC		FNNAC	
	Total Score	Average score	Total Score	Average score
Background Blood	22	1	22	1
Amount of cellular material	22	1	30	1.36
Retention of Architecture	26	1.18	30	1.36
Cellular degeneration	22	1	18	0.81
Cellular Trauma	18	0.81	18	0.81
Cumulative Score	110	5	118	5.36

**Background Blood or clot**

The total score in FNAC was 22 and in FNNAC 22 with an average score of 1 and 1 respectively.

**Amount of Cellular Material**

The total and average score in FNAC 22 and 1 and in FNNAC 30 and 1.36 respectively. There was high score in non-aspiration

**Retention of Appropriate Architecture**

The total and average score in FNAC 26 and 1.18 and in FNNAC 30 and 1.36 respectively

**Amount of Cellular Degeneration**

The total and average score in FNAC 22 and 1 and in FNNAC 18 and 0.81 respectively.

**Cellular Trauma**

The total and average score similar in both the techniques ie 18 and 0.81 respectively [Table 3]

**THYROID NEOPLASMS**

Our study included 22 cases of follicular neoplasm, 8 cases of papillary carcinoma and including 2 cases of follicular neoplasm/cellular phase of goitre. In follicular neoplasm aspirates were highly cellular with little or absent colloid. Cells were arranged in syncytial aggregates and in follicular pattern. One case showed metastases to cervical lymphnode. In this case the follicular epithelial cells showed variation in nuclear size, hyperchromatic nuclei and prominent nucleoli.

In one case increased cellularity was associated with moderate amount of colloid in the background. The cells were round with scanty cytoplasm and round regular nuclei. Hence, it was reported as follicular neoplasm/cellular phase of goitre, as it is difficult to differentiate between the two.

In papillary carcinoma, cells were arranged in papillary fronds and clumps. These cells showed anisonucleosis, nuclear inclusions, nuclear grooves and multinucleated giant cells. Background showed macrophages.

**Table-4: Total and Average Scores in Thyroid Neoplasm’s**

Criteria	FNAC		FNNAC	
	Total Score	Average score	Total Score	Average score
Background Blood	30	1	35	1.16
Amount of cellular material	45	1.5	40	1.33
Retention of Architecture	40	1.33	35	1.16
Cellular degeneration	35	1.16	30	1
Cellular Trauma	35	1.16	40	1.33
Cumulative Score	185	6.1	180	6

**Background Blood or Clot**

The total score in FNAC was 30 and in FNNAC 35. The average score was 1.0 in FNAC and 1.16 in FNNAC.

**Amount of Cellular Material**

The total and average scores in FNAC were 45 and 1.5 and in FNNAC 40 and 1.33 respectively.

**Retention of Appropriate Architecture,**

The total and average scores were 40 and 1.33 in FNAC and 35 and 1.16 in FNNAC.

**Amount of Cellular Degeneration**

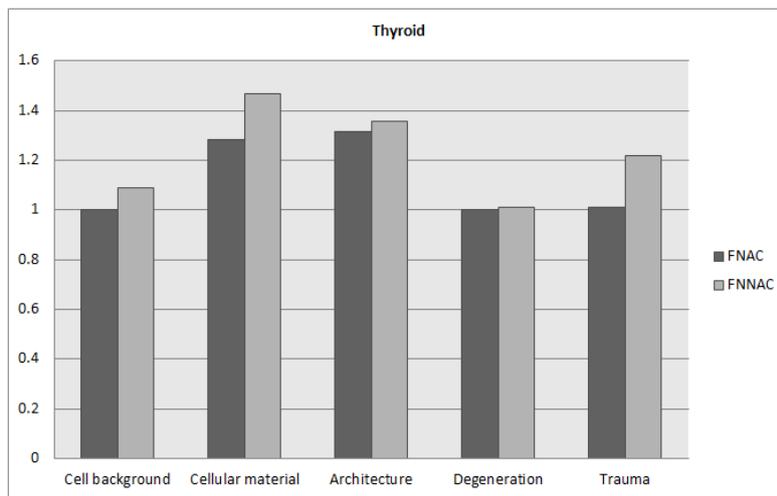
The total and average scores were 35 and 1.16 in FNAC and 30 and 1 in FNNAC

**Cellular Trauma**

The total and average scores were 35 and 1.16 in FNAC and 40 and 1.33 in FNNAC. The average cumulative scores were 6.1 in FNAC and 6 in FNNAC [Table 4].

**Table-5: Total and Average Scores for each Criteria Studied in Thyroid Lesions**

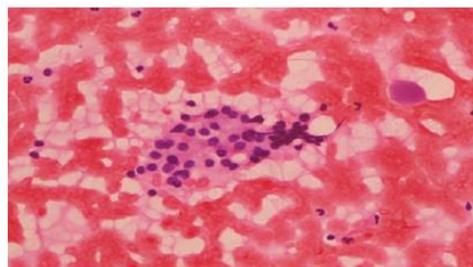
Criteria	FNAC		FNNAC		P-Value
	Total Score	Average score	Total Score	Average score	
Background Blood	92	1	99	1.07	0.145
Amount of cellular material	117	1.27	135	1.46	0.012
Retention of Architecture	121	1.31	125	1.35	0.54
Cellular degeneration	92	1	93	1.01	0.85
Cellular Trauma	93	1.01	108	1.17	0.004
Cumulative Score	515	5.59	560	6.08	0.002



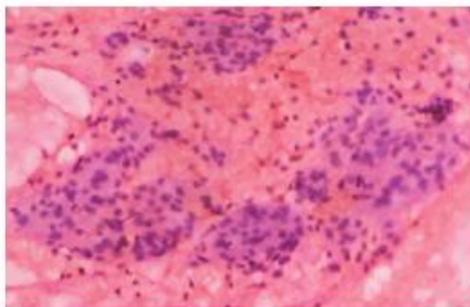
**Fig-1: Showing comparison between FNAC and FNNAC**

In all thyroid lesions, the non-aspiration technique showed statistically significant superior results to aspiration technique in the parameters,

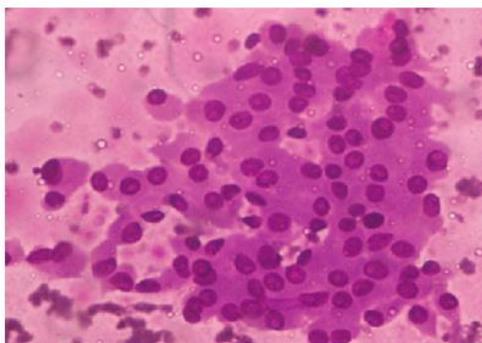
Amount of cellular material, cellular trauma and cumulative score [Table 5 & Figure 1].



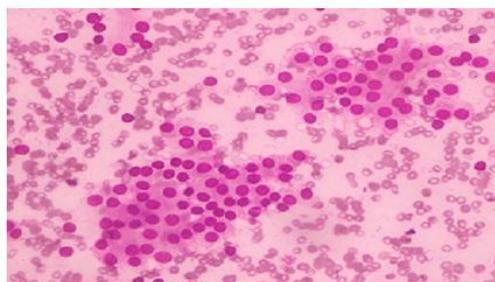
**Fig-2: Smears studied shows folicular epithelial cells arranged in clusters and scattered singly - Colloid Goitre 40x (H&E)**



**Fig-3: Smears studied shows follicular epithelial cells admixed with Hurthle cells, epithelioid cells against a lymphocytic background- Hashimoto Thyroiditis( x100, H&E)**



**Fig-3: Smear showing Nuclear inclusions with abundant eosinophilic cytoplasm - Papillary Carcinoma Thyroid (400x, Giemsa)**



**Fig-4: Smears showing follicular epithelial cells arranged in acini- Follicular Neoplasm (H&E, x 400)**

## DICUSSIONS

The group comprised of 92 cases (67.85%). The various lesions encountered in the order of decreasing frequency were 40 cases of colloid goitre (43.47%), 22 cases of follicular neoplasm (23.91%), 2 cases of de-Quervain's thyroiditis (2.10%), 18 cases of chronic lymphocytic thyroiditis (19.56%) 8 cases of (8.6%) papillary carcinoma and 2 cases follicular neoplasm/multinodular goitre.

In a study by Kamal M.M. *et al.* [1] also colloid goitre was the commonest thyroid lesion. In the 40 cases of colloid goitre that were studied in the present series, FNNAC performed good as or better than FNAC. In thyroiditis and neoplasms, there was minimal difference in scores obtained in the two techniques. The FNNAC was as good as FNAC and was diagnostic in all the cases. For thyroid lesions, the non-aspiration technique was better than the aspiration technique in all the parameters. The difference was statistically significant in amount of cellular material

and degree of cell trauma. In the study by Misra R.K. *et al.* [2], the non-aspiration technique had significantly less blood contamination; and the aspiration technique had better retention of architecture.

There was significant difference between the two techniques in the amount of cellularity, and amount of cell trauma. In the study by Kamal M.M. *et al.* the FNNAC yielded significantly higher amount of cellular material. Jayaram *et al* [3]. In their study of 220 thyroid lesions did not find any difference between the two techniques, in the morphology or preservation of the cells. Similar results were noted in the present study also.

In the present study, superior quality material was seen in more number of non-aspiration samples than in aspiration samples. These findings were similar to the results of Santos *et al.*[4]. In their study diagnostically superior material was obtained in 44% of non-aspiration samples and 8% of aspiration samples.

The study by Kamal M.M. *et al.* also showed higher values for the non-aspiration technique (49.5%) than for the aspiration technique (44%).

In the present study the average cumulative score was 6.08 in FNNAC and 5.59 in FNAC. Similar results were seen in the study by Misra R.K. *et al.* & Ghosh A. *et al.* with higher scores for the non-aspiration technique. The results of the present study were in favour of the non-aspiration technique as in the previous studies

#### **CONCLUSION**

Fine Needle Non Aspiration Cytology often produces: Superior quality specimens with good amount of cellular material and less degree of cellular trauma, it has better patient acceptability and it is an easy technique.

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