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Accuracy of diagnosis by Fine Needle Non Aspiration Cytology technique in head and neck swellings: Its advantages and disadvantages in comparison to Fine Needle Aspiration Cytology

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Abstract

Background & Objectives: Fine needle aspiration cytology (FNAC) is a first line investigation in the diagnosis of head and neck swellings. The negative pressure applied during aspiration leads to bloody smears, especially in vascular organs like thyroid. In 1981 fine needle non-aspiration cytology (FNNAC) was introduced. The present study was undertaken to compare FNAC and FNNAC techniques in head and neck swellings.

Methods: One hundred and ninety seven head and neck swellings were sampled using both FNAC and FNNAC techniques. They were compared for the five objective parameters, amount of background blood or clots, amount of cellular material present, retention of appropriate architecture, degree of cellular degeneration and degree of cellular trauma, using Mair's point scoring system. Statistical analysis was done using Mann Whitney's test. The differences were considered significant at $P \leq 0.05$.

Results: Blood contamination was less in FNNAC as compared to FNAC in all the cases. The difference was statistically significant in thyroid, lymph node and salivary gland lesions. Cellular yield was more in FNNAC in thyroid and lymph node lesions with a significant difference being noted only in lymph node lesions. Better retention of architecture with a statistically significant difference was seen in FNNAC smears from lymph node and thyroid lesions. There was no significant difference between the two techniques in degree of cellular degeneration and cellular trauma. More number of FNNAC smears were diagnostically superior. The diagnostic yield in FNAC was 93.43% and in FNNAC 94.28%.

Conclusion: The FNNAC technique provides adequate cellular yield in all head and neck swellings, except in cystic and fibrotic swellings where FNAC is a better technique.

Keywords: Fine Needle Aspiration cytology, Fine needle non aspiration cytology, Thyroid, Lymph nodes, Salivary gland.

1. Introduction

The history of fine needle aspiration cytology (FNAC) dates back to as early as 1883, when Leyden used needle to obtain cells and tissue fragments from lungs of pneumonia patients to isolate microorganisms. [1] Since then FNAC has grown into a unique speciality. FNAC is being done on swellings of variable size, superficial and deep seated swellings, intra-abdominal organs, soft cystic masses and bony swellings. The ease of the technique, the quickness of diagnosis and it being an OPD procedure has made it the first line of investigation [2] in palpable masses anywhere in the body especially in the head and neck area. It also has an added advantage of saving on medical expenditure for the patients.

Almost 100 years later in 1981, fine needle non aspiration cytology (FNNAC) was introduced by Zajdela *et al*, at the Institute Curie, Paris. Here fine needle sampling

was done using 23 or 25 gauge needles, without applying negative pressure on a series of 635 benign and malignant breast tumours. In this method cells are detached by the cutting edge of the needle and are conducted into the lumen by the capillary force. A cellular yield comparable to that of FNAC technique was obtained. This technique was later used for orbital and periorbital tumors. Brifford *et al* in 1982 utilised this technique for follow-up of breast carcinoma. [3]

This study was undertaken to find out the usefulness and cost effectiveness of FNNAC technique and accuracy of diagnosis. The advantages and disadvantages of both FNAC and FNNAC techniques are evaluated and compared.

2. Materials and Methods

This was a prospective study carried out over a period of 1 year. A total of 209 patients with head & neck swellings were included in the study. After obtaining informed consent all the patients were first subjected to fine needle non-aspiration cytology (FNNAC) using 23/24 gauge needles. This was followed by fine needle aspiration cytology(FNAC) using 10 or 20ml syringe attached to 23/24 gauge needle [Fig 1, A]. In each of the two techniques 2-4 needle passes were done. Smears were made on the slides labelled for each of these techniques. Two to four slides were immediately fixed in ether alcohol for 30 minutes and the rest were air dried. The air dried smears were fixed in methanol for 30 minutes and stained with May Grunwald Giemsa (MGG) stain. The wet fixed slides were stained with Papanicolaou (Pap) stain and haematoxylin and eosin (H&E) stain. Ziehl-Neelsen stain was done where required.

The two techniques were assessed for the following parameters.

1) Background blood or clot. 2) Amount of cellular material. 3) Degree of cellular degeneration. 4) Degree of cellular trauma. 5) Retention of appropriate architecture.

For each parameter points were allotted using Mair's scoring system [Table 1]. The cumulative score ranges from 0 to 10. Each slide was allotted to one of the three categories based on the score as follows. Score0-2: 'Unsuitable for diagnosis', score 3-6: 'Adequate for diagnosis' and score 7-10: 'Diagnostically superior'. [4]

Results were analysed using Mann Whitneys test. Statistical significance was considered at a level $p \leq 0.05$.

Table 1: Method of Point Allocation. Mair's scoring system.

Criterion	Quantitative Description	Point Score
Background blood or clot	Large amount; great compromise to diagnosis. Moderate amount ; diagnosis possible Minimal; diagnosis easy ; specimen of 'text book' quality	0 1 2
Amount of cellular material	Minimal to absent, diagnosis not possible Sufficient for cytodiagnosis Abundant ; diagnosis simple	0 1 2
Degree of cellular degeneration	Marked; diagnosis impossible Moderate; diagnosis possible Minimal; good preservation, diagnosis easy	0 1 2
Degree of cellular trauma	Marked; diagnosis not possible Moderate; diagnosis possible Minimal; diagnosis obvious	0 1 2
Retention of appropriate architecture	Minimal to absent; non diagnostic Moderate; some preservation of e.g. Follicles, papillae, acini, flat sheets, syncytia or single cell patterns. Excellent architectural display closely reflecting histology; diagnosis obvious	0 1 2

3. Results

A total of 209 patients with head and neck swellings were sampled. They were in the age group of 1.5 years to 80 years. There were 120 females and 89 males with a ratio of 1.35:1. Out of the 209 cases only in 197 cases both aspiration and non-aspiration techniques were performed. The wide variety of lesions sampled fall into four groups. Lesions of Lymphnode-134 cases (68%), thyroid-40 cases (20%), salivary gland-12 cases (6%) and miscellaneous category-11 cases (6%).

3.1 Lymph node

Lymph node lesions constituted a major group with 68%. The various diagnostic categories included tuberculous lymphadenitis 51 cases (38%), metastatic carcinoma 20 cases (15%), reactive hyperplasia 28 cases (21%), acute suppurative lymphadenitis 15 cases (11%) and non-specific lymphadenitis 20 cases (15%). The FNNAC technique was superior to FNAC with respect to background blood or clot, amount of cellular material and retention of appropriate architecture. The cumulative score in FNNAC was more than in FNAC. This difference was statistically significant. [Table 2]

The material obtained was diagnostically superior in 86% of tuberculous lymphadenitis [Fig 1, B & C], 100% of reactive hyperplasia [Fig 1, D], 93% of acute suppurative lymphadenitis and 95% of non specific lymphadenitis by FNNAC technique. More number of FNAC samples were 'adequate for diagnoses. Both the techniques yielded diagnostically superior material in 'lymph nodes with metastatic malignancy' [Fig 2, A, B & C, Fig 5, B]. [Table 3]

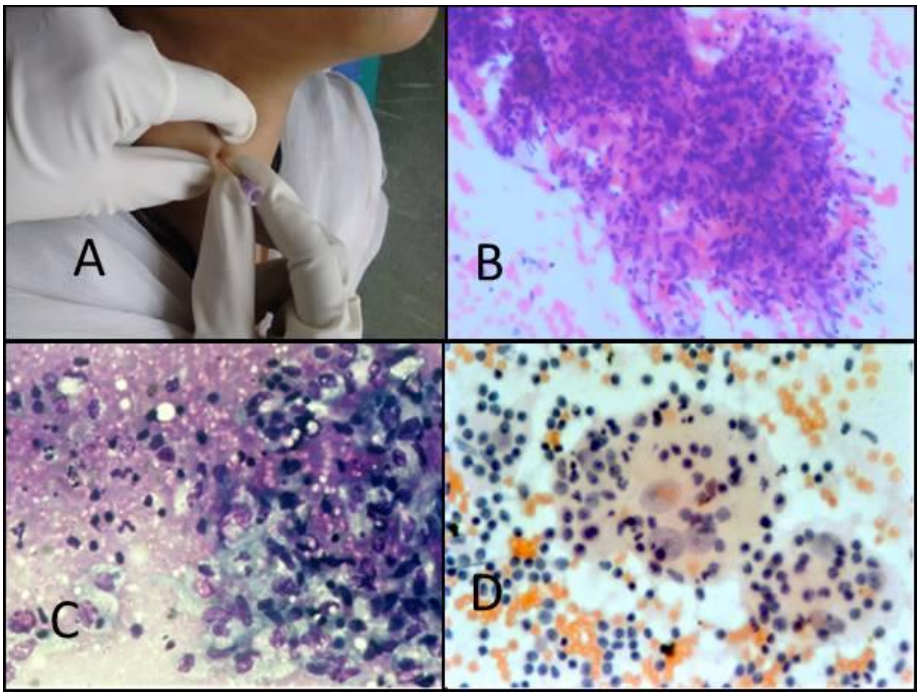

Figure 1: (A) FNNAC procedure. (B, C, D) Microphotographs of FNNAC smears showing less background blood. (B&C) Tuberculous lymphadenitis, (B) Granuloma comprising of epithelioid cells, histiocytes and lymphocytes. H&E stain, 400X. (C) Epithelioidhistiocytes and lymphocytes in a necrotic background. MGG stain, 400X. (D) Rosai Dorfman disease showing emperipolesis. Pap stain, 400X.

Table 2: Total and Average Scores in Lymph node Lesions

Criteria	FNAC		FNNAC		P-Value
	Total score	Average score	Total score	Average score	
Background	169	1.26	255	1.90	0.0000
Amount of cellular material	200	1.49	239	1.78	0.0000
Architecture	167	1.25	224	1.67	0.0000
Cellular degeneration	224	1.67	232	1.73	0.4966
Cellular Trauma	206	1.54	214	1.60	0.4778
Cumulative Score	966	7.21	1164	8.69	0.0000

Table 3: Performance of FNAC & FNNAC in various lymph node lesions

Lesion	Technique	Diagnostically superior		Diagnostically adequate		Insufficient for diagnosis	
		No. of cases	%	No. of cases	%	No. of cases	%
Tuberculosis (51)	FNAC	32	62.75	16	31.37	03	5.88
	FNNAC	44	86.27	06	11.76	01	1.96
Reactive hyperplasia (28)	FNAC	25	89.29	03	10.07		
	FNNAC	28	100	-	-		
Acute suppurative lymphadenitis (15)	FNAC	11	73.33	04	26.67		
	FNNAC	14	93.33	01	6.67		
Metastatic malignancy (20)	FNAC	19	95	01	5.0		
	FNNAC	19	95	01	5.0		
Non-specific lymphadenitis (20)	FNAC	16	80	04	20		
	FNNAC	19	95	01	05		

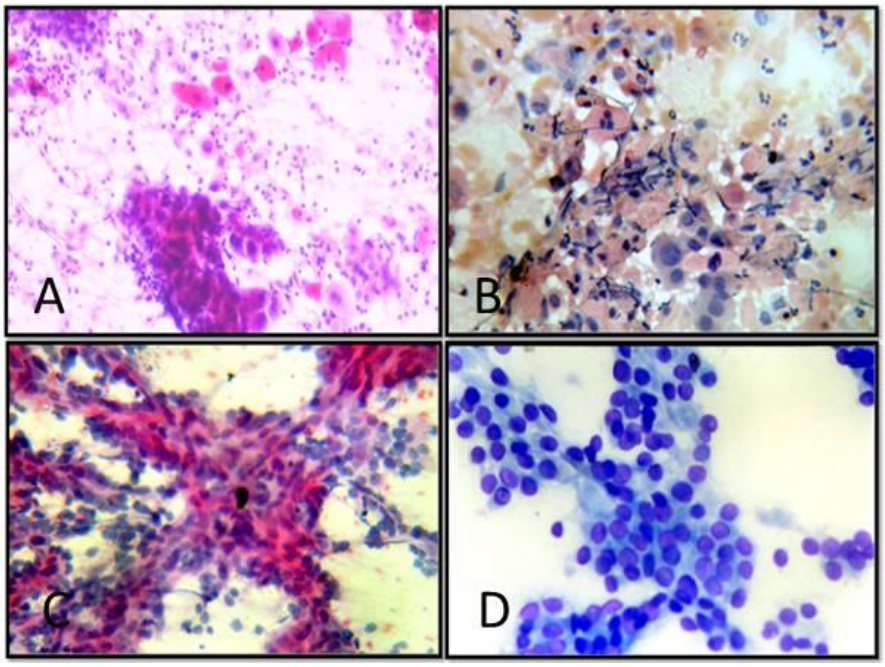

Figure 2: Microphotographs of FNNAC smears showing abundant cellularity. (A&B)Metastatic squamous cell carcinoma-lymph node, polygonal cells with large hyperchromatic nuclei arranged singly and in clusters in an inflammatory background. A- H&E stain, 100X. B-Pap stain, 200X. (C) Metastatic papillary adenocarcinoma-lymph node, branching papillae with central fibrovascular core lined by neoplastic cells. Pap stain, 400X. (D) Acinic cell tumour salivary gland-aggregation of epithelial cells with mild nuclear atypia and abundant finely vacuolated cytoplasm. MGG Stain, 400X

3.2 Thyroid

Lesions of the thyroid constituted the second major group with 40 cases. It included 29 cases of colloid goitre (73%), 2 cases of chronic lymphocytic thyroiditis, 3 cases of de-Quervain's thyroiditis [Fig 3], 5 cases of follicular neoplasm and 1 case of papillary carcinoma [Fig 4]. The FNNAC technique was superior to FNAC with statistically significant difference in the parameters 'background blood or clot, retention of appropriate cellular architecture and cumulative score'.[Table 4]

The FNNAC was a better technique as it provided diagnostically superior material in 100% cases of colloid goitre while FNAC was superior in 83% cases only. In thyroiditis and thyroid neoplasms both techniques provided diagnostically superior material in all (100%) the cases.

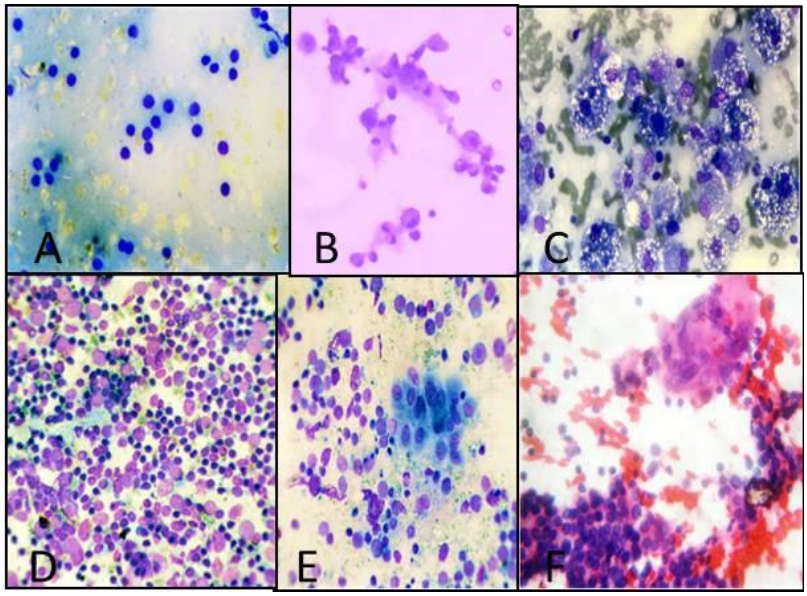

Figure 3: Microphotographs of FNNAC smears from thyroid lesions. (A)Colloid goiter-small clusters of follicular epithelial cells in colloid background. MGG stain, 400X. (B & C)Colloid goiter with cystic change - Cyst macrophages and follicular epithelial cells. MGG stain, B 100X, C 400X. (D) Chronic lymphocytic thyroiditis. MGG stain, 400X. (E) Hashimoto's thyroiditis- cluster of Hurthle cells in a lymphoid background. MGG stain, 400X. (F) de-Quervain's thyroiditis- multinucleated giant cell and follicular cells. Pap stain, 200X.

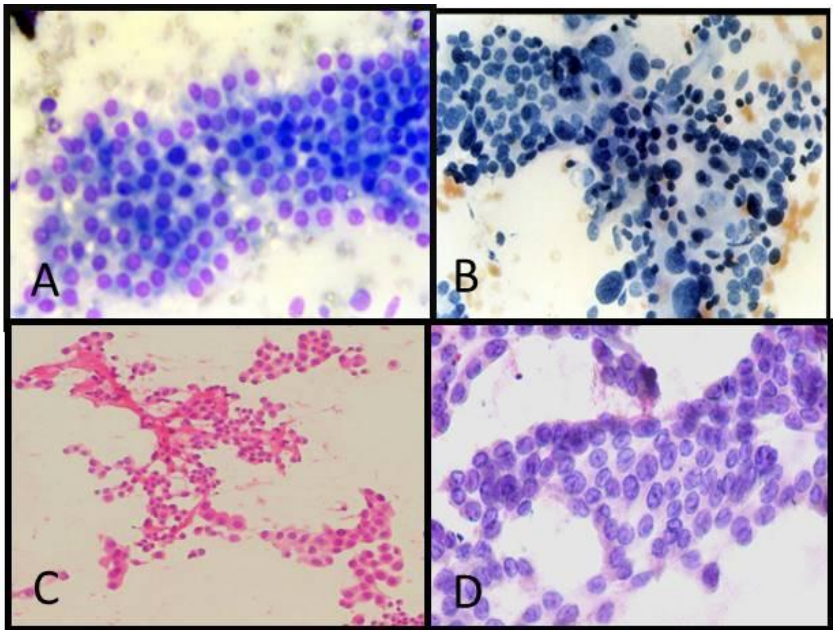

Figure 4: Microphotographs of FNNAC smears showing retention of appropriate architecture. (A) Follicular neoplasm-sheets of follicular epithelial cells with scant colloid. MGG Stain, 400X. (B) Follicular carcinoma-syncytial aggregation of cells showing variation in size, nuclear crowding and overlapping. MGG Stain, 400X. (C&D) Papillary carcinoma thyroid, (C) Cells arranged in clusters and papillae with a central fibrovascular core. H&E Stain, 100X. (D) Sheets of cells with nuclear groves and overlapping. Pap Stain, 400X

Table 4: 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	36	0.9	59	1.48	0.0000
Amount of cellular material	56	1.4	63	1.58	0.1582
Architecture	53	1.33	64	1.6	0.0328
Cellular degeneration	78	1.95	80	2.0	0.8494
Cellular Trauma	77	1.93	79	1.98	0.8494
Cumulative Score	304	7.6	351	8.78	0.0001

3.3 Salivary glands

There were 12 cases of salivary gland swellings. The various lesions included 4 cases of acute sialadenitis, 2 cases each of chronic sialadenitis and acinic cell tumour, 3 cases of pleomorphic adenoma and 1 case of adenoid cystic carcinoma [Fig 2, D and Fig 5, C & D]. FNNAC had less haemorrhagic background in comparison to FNAC with statistically significant difference. However, FNAC yielded better cellularity and good preservation of architecture. [Table 5]

Table 5: Total and average scores in salivary gland lesions

Criteria	FNAC		FNNAC		P-Value
	Total Score	Average score	Total Score	Average score	
Background	15	1.25 ± 0.45	21	1.75 ± 0.45	0.0180
Amount of cellular material	23	1.92 ± 0.29	18	1.5 ± 0.67	0.0665
Architecture	23	1.92 ± 0.29	18	1.5 ± 0.67	0.0665
Cellular degeneration	21	1.75 ± 0.45	21	1.75 ± 0.45	1.0000
Cellular Trauma	19	1.58 ± 0.51	19	1.58 ± 0.51	1.0000
Cumulative Score	101	8.42 ± 1.0	97	8.08 ± 1.68	0.6528

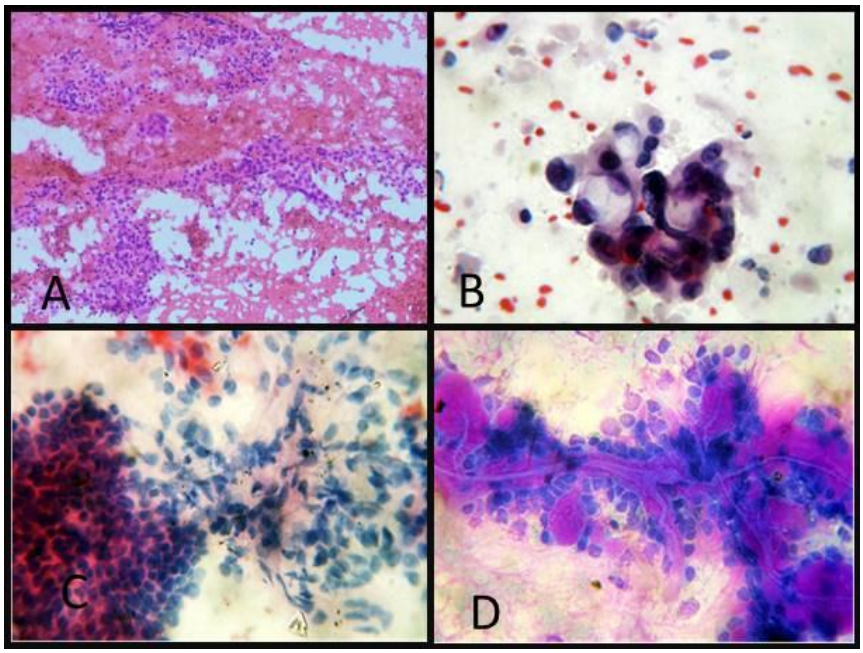

Figure 5: Microphotographs of FNAC smears.(A)Hashimoto's thyroiditis with large amount of background blood. H&E stain, 100X. (B) Metastatic mucinous adenocarcinoma-lymph node, cluster of signet ring cells, nuclei are hyperchromatic and pushed to periphery. Pap Stain, 400X. (C) Pleomorphic adenoma, a cluster of epithelial cells, and spindle shaped mesenchymal cells in a background of stromal matrix. Pap Stain, 200X. (D)Adenoid cystic carcinoma-salivary gland, magenta coloured finger like hyaline stroma present between cells. The cells are small with round to oval nuclei and scant cytoplasm. MGG Stain, 400X

3.4 Miscellaneous

This category had 11 cases comprising of 3 cases of dermoid cyst, one case each of branchial cyst, thyroglossal cyst, nasolabial cyst, adenocarcinoma of eyelid, adenocarcinoma of maxilla and squamous cell carcinoma of maxilla. The last two cases were inconclusive, as the exact nature of the lesion could not be made out, except for chronic inflammatory cells in one case and few atypical cells in the other case. They were reported as chronic inflammatory lesion and lesion with atypical cytology respectively. There was no significant difference in cumulative scores between the two techniques in the miscellaneous category.

3.5 Performance of FNAC and FNNAC in various sites

In lymph node aspirates, FNNAC was diagnostically superior in 124/134 cases (92.5%). FNAC was superior in 103/134 cases (77%) only. Diagnostically adequate material was seen in 28 cases (21%) of FNAC and 9 cases (7%) of FNNAC. All the thyroid swellings yielded diagnostically superior material in FNNAC, while only 35 cases (87.5%) yielded diagnostically superior material in FNAC. In salivary gland lesions diagnostically superior material was seen in all cases of FNAC, while only 10/12 cases (83%) were superior in FNNAC.[Table 6].

More number of FNNAC (93%) samples were diagnostically superior as compared to FNAC (81%). However diagnostic adequacy was more in FNAC samples(17%) as compared to FNNAC (6%).[Table 7]

Table 6: Performance of FNAC and FNNAC in various sites

Lesions (No. of cases)	Technique	Diagnostically superior		Diagnostically adequate		Insufficient for diagnosis	
		No. of cases	%	No. of cases	%	No. of cases	%
Lymphnodes (134)	FNAC	103	76.9	28	20.9	03	2.2
	FNNAC	124	92.5	09	6.7	01	0.7
Thyroid (40)	FNAC	35	87.5	04	10	01	2.5
	FNNAC	40	100	_		_	
Salivary glands (12)	FNAC	12	100	_		_	
	FNNAC	10	83.3	02	16.7	_	
Miscellaneous (11)	FNAC	10	91	01	9.0	_	
	FNNAC	10	91	_		01	9.0

Table 7: Performance of FNAC and FNNAC in head and neck swellings

Result / Performance	FNNAC		FNAC	
	No. of Cases	% of Cases	No. of Cases	% of Cases
Diagnostically superior	184	93.40	160	81.2
Diagnostically adequate	11	5.6	33	16.8
Insufficient	2	1.0	4	2.0
Total	197	100	197	100

4. Discussion

In the present study of 197 aspirates from head and neck swellings, lymph nodes comprised the largest group with 68% of cases, followed by thyroid 20%, salivary glands 6% and miscellaneous category 6%. In a study by Misra *et al*, lymph nodes constituted 63%, thyroid 16.3%, salivary glands 6.3% and miscellaneous lesions 6.3% of cases.[5]

In the lymph node aspirates, tuberculosis (51 cases) was the commonest lesion followed by reactive hyperplasia, metastatic malignancy, non-specific lymphadenitis and acute suppurative lymphadenitis. As tuberculosis is the most prevalent infection in India and also majority of the patients coming to Civil Hospital were of low socio-economic background, tuberculosis was the commonest lesion encountered in our study. In tuberculous lesions with soft consistency FNAC yielded more necrotic material, while FNNAC gave more cellular samples with better preservation of architecture and less blood contamination. In firm, fibrotic swellings aspiration was better as it yielded more cellular material. The FNNAC technique performed significantly better than the FNAC technique in all the parameters except in the amount of cellular degeneration and trauma, in which the scores for the two techniques were almost equal.

Acute suppurative lymphadenitis was seen in 15 cases (11%). Purulent material was aspirated from firm neck swellings. Smears showed plenty of necrotic debris, few neutrophils and lymphocytes. ZN stain for acid fast bacilli (AFB) was negative. Clinically tuberculosis was suspected but neither epithelioid cells nor AFB could be demonstrated. Both the techniques performed equally well except that blood contamination was less in non-aspiration technique. These lesions contained encysted purulent material and the non-aspiration technique causes very little trauma to the tissue and hence less blood contamination.

In highly cellular lesions like reactive hyperplasia and metastatic malignancy, both the techniques yielded comparable cellular material. In addition the amount of background blood /clot was less in metastatic malignancy. In non-specific lymphadenitis, the non-aspiration technique was significantly better than aspiration technique with regard to background blood, amount of cellular material and retention of appropriate architecture. Hence FNNAC was a better technique than FNAC.

In the present study FNNAC was better than FNAC for lymph node lesions with respect to all the five parameters. Statistically significant difference was noted in background blood, amount of cellular material and retention of appropriate architecture. In a study by Misra *et al*, FNNAC showed statistically significant difference in the parameter background blood. Similar results have been obtained by Gosh *et al* in lymph node lesions [6] and Braun *et al*, in the head and neck swellings.[7] In the present study non-aspiration technique yielded good amount of cellular material with statistically significant difference. Similar results were noted in the study of superficial lymphadenopathy by Akhtar *et al*.[8] Another study by Cajulis RS & Sneige N. found that FNNAC provides an adequate number of cells both for diagnosis and for special studies.[9]

Misra *et al* found retention of architecture to be better in the non-aspiration technique. These findings are in concordance with the present study. Mair *et al* and Braun *et al* also have found similar findings.[4,7] When compared for the degree of cellular trauma and cellular degeneration better results were obtained by FNNAC, though the differences were marginal. In the present study, the average cumulative score was 8.69 for FNNAC and 7.2 for FNAC, similar to that obtained by Ghosh *et al* and Misra *et al*.[5,6]

Excess pressure applied while making the smears can cause crushing and fragmentation of cells. If smears are not fixed immediately or if excess blood is present, it can alter or obscure the cell morphology. In the present study, both the aspiration and the non aspiration techniques were performed by a single pathologist who also prepared the smears by applying optimal pressure avoiding clumping of the cells. Smears were fixed immediately in appropriate fixative followed by staining and hence, no significant difference was noticed in amount of cellular degeneration and trauma.

Thyroid was the second largest group with 40 cases, of which 29 cases were of colloid goitre (72.5%), 5 cases of follicular neoplasm (12.5%), 3 cases of de-Quervain's thyroiditis (7.5%), 2 cases of chronic lymphocytic thyroiditis (5.0%) and one case of papillary carcinoma (2.5%). Similar distribution of lesions were

found with Colloid goitre being the commonest thyroid lesion in studies by Kate *et al* and Kamal *et al*. [10,11]

In all the 29 cases of colloid goitre, FNNAC performed better than FNAC. Statistically significant difference in favour of FNNAC was obtained in the parameters background blood, amount of cellular material and retention of appropriate architecture. In thyroiditis and thyroid neoplasms, there was minimal difference in scores obtained in the two techniques. Overall in thyroid lesions, the non-aspiration technique was better than the aspiration technique in all the parameters. Similar results were noted in the studies by Ghosh *et al* and Kamal *et al*.[6,11] In the study by Misra R.K. *et al*., the non-aspiration technique had significantly less blood contamination and the aspiration technique had better retention of architecture.[5]

There was no significant difference between the two techniques in the amount of cellularity, amount of cell degeneration and trauma. In the study by Kamal *et al* the FNNAC yielded significantly higher amount of cellular material. Jayaram *et al*[12] in their study of 220 thyroid lesions did not find any difference between the two techniques, in preservation of cell morphology, similar to the present study.

In the present study, superior quality material was seen in more number of non-aspiration samples (100%) than in aspiration samples (87.5%). These findings were similar to the results of Santos *et al*.[13] In their study diagnostically superior material was obtained in 44% of non-aspiration samples and 8% of aspiration samples. The study by Kamal *et al* also showed higher values for the non-aspiration technique (49.5%) than for the aspiration technique (44%).[11] In the present study the average cumulative scores were 8.78 in FNNAC and 7.6 in FNAC. Similar results were seen in the study by Misra *et al* & Ghosh *et al*.

The results of the present study favour FNNAC over FNAC technique for thyroid, as in the previous studies. But the scores obtained in the present study were significantly higher as smears were immediately assessed for cellularity and if found negative the procedure was repeated. The number of needle passes was restricted to less than four; in each pass a different needle track was taken which reduces aspirating blood from previous trauma.

Salivary Gland lesions comprised 12 cases of all the head and neck swellings which included 4 cases of acute sialadenitis, 3 cases of pleomorphic adenoma, 2 cases each of chronic sialadenitis and acinic cell tumour and 1 case of adenoid cystic carcinoma. The aspiration technique yielded more cellular material with good preservation of the architecture. Similar results were seen by Misra *et al*, where amount of cellularity and retention of architecture were better in the aspiration technique.[5] Study by Mair *et al* also showed better retention of architecture in the aspiration technique.[4] The amount of background blood was considerably less in the non-aspiration technique with a statistically significant difference. Similar results were seen in the study by Misra *et al*. In the study by Mair *et al*, there was no difference in the two techniques.

In the present study, the amount of cellular degeneration and cellular trauma was comparable in the two techniques. These findings were in contrast to the study by Misra *et al*, who found non-aspiration technique to be better for both the parameters. Similarly, in the study conducted by Mair *et al*, the non-aspiration technique was better in reducing the cellular degeneration, but cellular trauma was less in the aspiration technique. The average cumulative score was higher in the aspiration technique, in contrast to previous studies of Misra *et al* and Mair *et al*. But this difference was not statistically significant.

In the non-aspiration technique the needle can be moved freely in any desired direction. It causes less blood contamination and is less painful. In the aspiration technique, keeping the plunger pulled back to create a negative pressure, it becomes difficult to control the precise needle movements, causing more trauma and hence more blood contamination. The negative pressure created in the non-aspiration technique is not sufficient to obtain the thick myxoid stroma of the pleomorphic adenoma. The inflammatory lesions were more fibrotic requiring more negative pressure to aspirate.

The miscellaneous category included 11 lesions, which comprised of six cystic lesions and one each of adenocarcinoma of the eyelid, adenocarcinoma of the maxilla, squamous cell carcinoma of the maxilla, atypical cytology not conclusive of malignancy and chronic inflammatory lesion. In the present study less blood contamination was seen in the non-aspiration technique, while better cellularity was seen in the aspiration technique. Similar results were obtained in the study by Misra RK *et al*. Retention of appropriate architecture was equally good in both the techniques. The amount of cellular degeneration and cellular trauma was less in the aspiration technique. These differences were not statistically significant. But in the studies by Misra *et al* and Mair *et al*, the non-aspiration technique produced less cellular degeneration and trauma.[4,5]

In a cyst from the nasolabial region, the aspiration technique was better as the cyst contents could be completely aspirated, while in the non-aspiration technique scanty material was obtained. Thyroglossal cyst contained thick colloid and the branchial cyst mucoid material. Here too, the aspiration technique was better than FNNAC as the negative pressure created in the needle was not sufficient to obtain an adequate sample. In other solid lesions both the

techniques yielded cellular samples with good preservation of architecture and minimal blood contamination.

The average cumulative score in miscellaneous group was higher in the aspiration technique than in the non-aspiration technique. This was in contrast to the studies by Misra *et al* and Mair *et al*.[4,5]

5. Conclusion

FNAC and FNNAC are simple outpatient department procedures. Their main advantages are faster diagnoses and shorter hospital stay, hence less expenditure to the patient. FNNAC provides adequate material with better cytomorphology for accurate diagnosis in most of the head and neck swellings. In lesions of thyroid, lymph node and other non-neoplastic lesions the cumulative scores of FNNAC were higher (93.4%) than for FNAC (81.2%). In our experience FNNAC has all the advantages of FNAC and in addition it causes less apprehension and pain in pediatric patients. It yields better material in tiny swellings, where FNAC would result in overshooting and hence missing the lesion. However in cystic lesions and some solid lesions such as pleomorphic adenoma the FNAC is superior to FNNAC. Therefore, choice of the technique hence depends upon the nature of the lesion, whether cystic or solid, size of the lesion and the patient undergoing the procedure. It is best decided by the pathologist as to which technique yields better results and aids in accurate diagnosis.

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