

A COMPARATIVE STUDY OF FINE NEEDLE ASPIRATION AND FINE NEEDLE NON- ASPIRATION TECHNIQUES IN HEAD AND NECK SWELLINGS

AFFILIATION OF AUTHORS: **DR SIMA SONOWAL** ,ASSISTANT PROFESSOR DEPT OF PATHOLOGY, ASSAM MEDICAL COLLEGE & HOSPITAL. PH NO- 9854062397, drsima83@gmail.com

DR ADITY SHARMA, PROFESSOR & HOD DEPT OF PATHOLOGY, ASSAM MEDICAL COLLEGE & HOSPITAL, PH NO-9435033505, munmunbharadwas@yahoo.co.in

DR MAUSHOOMI BARUAH, DEMONSTRATOR, ASSAM MEDICAL COLLEGE& HOSPITAL, PH NO-7002746153, mausoomibaruah@gmail.com

DR APARNA HAZARIKA, PROFESSOR ,KOKRAJHAR MEDICAL COLLEGE,PH NO-9864117737(**CORRESPONDING AUTHOR**),arpanahazarika@gmail.com

DR SANGHMITRA MUKHERJEE, DEMONSTRATOR, ASSAM MEDICAL COLLEGE& HOSPITAL,PH NO-9706612464, pmukherji25@gmail.com

DR APARNA DUTTA, ASSOCIATE PROFESSOR, ASSAM MEDICAL COLLEGE& HOSPITAL, PH NO-9435702769,draparnakamal@gmail.com

POSTAL ADDRESS OF AUTHORS: PATHOLOGY DEPARTMENT, ASSAM MEDICAL COLLEGE& HOSPITAL , DIBRUGARH

ABSTRACT:

Background: Fine needle aspiration cytology(FNAC) technique has undergone various modification over a period of time. The technique is relatively painless, inexpensive and produces a speedy result. It was thought to cause cell trauma , altering the cell morphology. This lead to development of fine needle sampling without aspiration which is known as Fine Needle Non Aspiration Cytology(FNNAC). Head and neck region is characterized by proximity of tissues of various types and a wide range of primary and metastatic neoplasms. Hence, head and neck swellings were chosen for the comparative study of the two techniques.

Materials and Methods: This is one year cross sectional study which was carried out in the department of Pathology, Assam Medical College& Hospital, Dibrugarh , Assam. A total 62 cases were studied. After obtaining the consent , patients were first subjected to fine needle non-aspiration cytology followed by fine needle aspiration cytology. Two to four needle passes were done for each of the 2 techniques. Slides were labelled separately for each of the techniques before smears were made. Using Mair's system we compared the two techniques based on the following parameters Background blood or clot, amount of cellular material, Degree of cellular degeneration, degree of cellular trauma, minimal retention of appropriate architecture.

Results: In FNNAC , diagnostically superior material was obtained in 77.42% cases, as against 90.33% cases in FNAC. In all the head and neck swellings blood contamination was comparatively reduced in FNNAC. In lymph node and thyroid swellings FNNAC provided more cellular samples with good preservation of architecture. In Salivary gland, cystic, fibrotic swellings FNAC is better technique than FNNAC.

Conclusion: The ultimate purpose of FNAC/ FNNAC is to diagnose a lesion and thereby guides the clinician in selecting the appropriate treatment. Any one technique can be followed for making a diagnosis. FNNAC more often produces superior quality specimens with less blood contamination. It has better patient acceptability. FNAC is a better technique in cystic and fibrotic swellings.

Keywords:Fine Needle Aspiration Cytology, Fine Needle Non Aspiration Cytology, Head & Neck Swelling, Background,Contamination.

1. **Introduction:** FNAC was first described by Martin and Ellis in the year 1930 in the United States. An alternative method of FNNAC also known as cytopuncture was developed in France in the 1982 by BRIFFORD et al.¹

FNAC is relatively painless, inexpensive and produces speedy result. It was thought to cause cell trauma and altering the cell morphology. It also lead to blood aspirated in highly vascular organs like thyroid. This lead to development of fine needle sampling without aspiration, called as Fine Needle Non Aspiration Cytology(FNNAC). Utilizing just a needle and capillary pressure to suck cells into the needle lumen,it avoids aspiration and has been reported to overcome the problem of inadequate and bloody specimens from highly vascular organs.

Head and Neck region is characterized by proximity of tissues of various types and a wide range of primary and metastatic neoplasms. This places the Head and Neck region amongst the most interesting in cytology diagnosis. Hence , head and neck swellings were chosen for the comparative study of the two techniques, namely fine needle aspiration and fine needle non aspiration cytology.

2. **Material and Methods:** The present study was carried out in the Department of Pathology, Assam Medical College & Hospital, Dibrugarh, Assam. This is a one year cross sectional study. A total 62 cases were studied.

Inclusion criteria: All patient with head and neck swelling are included in the study

Exclusion criteria: 1. Tumours of vascular origin and central nervous system tumours

3. Unco-operative patients.

Using Mair's system we compared the two techniques based on the following parameters-Background of blood or clot, amount of cellular material, degree of cellular degeneration, degree of cellular trauma and minimal retention of appropriate architecture.

After obtaining the consent, patient were first subjected to fine needle non-aspiration cytology(FNNAC) followed by fine needle aspiration cytology(FNAC). 2 to 4 needle passes were done for each of the two techniques. Slides were labelled separately for each of the techniques before smears were made.

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 in several directions for a few seconds depending on the cellularity and vascularity of the tissue. The needle was withdrawn, connected to a disposable 10 ml syringe filled with air and material was expelled onto the glass slides. Using another glass slide smears were made by applying gentle and uniform pressure.

Fine Needle Aspiration Cytology: After the non-aspiration technique, another needle of 23-25 gauge attached to a disposable 10 ml 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 expel the material onto the glass slides. Smears were made as explained above.

In each technique few of the slides were immediately fixed in absolute alcohol and the rest were air dried. Air dried slides were stained with May Grunwald Giemsa stain. The other slides were stained with May Grunwald Giemsa stain. The other slides were fixed in absolute alcohol for minimum of 1 hour and later stained with Papanicolaou stain. Ziehl- Neelsen stain was done wherever tuberculosis was suspected.

Results and Observations: The 62 cases included in our study showed a wide variety of lesions. These cases were grouped based on the origin of the swelling into lymphnode, thyroid, salivary glands and miscellaneous.

These were subgrouped depending upon the cytology diagnosis. Each of these groups and subgroups were analysed and compared for the 4 objective parameters in the two techniques.

Our study included patients in the age group of 1 ½ years to 80 years, with a mean age of 35.36 years. There were 40 females and 22 males, with a female to male ratio 1.82: 1.

Table 1. Physical findings in head and neck swellings

PHYSICAL FINDINGS	NUMBER (n)	PERCENTAGE (%)
Lymph node swelling	38	61.30
Thyroid swelling Salivary	12	19.40

gland swelling	7	11.3
Miscellaneous	5	8.10
	62	100.00

Out of 62 cases of lymph node swelling were constituted a major group with 38 cases (61.3%), followed by thyroid swelling 12 cases (19.4%), salivary gland swelling 7 cases (11.3%) and miscellaneous 5 cases (8.1%).

Lymph node: 1. Background of blood

FNAC: Blood contamination was more in FNAC smears than in FNNAC smears. 26 (68.4%) out of 38 cases sampled by FNAC contained more blood. 12(31.6%) cases out of 38 cases sampled by FNAC contained less blood.

FNNAC: 8 (21.1%) out of 38 cases sampled by FNNAC contain more blood. 30 cases (78.9%) out of 38 cases sampled by FNNAC contain less blood.

The difference was statistically significant(p=0.000).

Table 2. Background of blood

Background of blood	FNAC		FNNAC	
	N	%	n	%
More Blood	26	68.40	8	21.10
Less Blood	12	31.60	30	78.90
Total	38	100.00	38	100.00

2.Amount of cellular material

FNAC: 14 (36.8%) out of 38 cases sampled by FNAC contain more cellular material. 24 cases (63.2%) out of 38 cases sampled by FNAC contain less cellular material.

FNNAC: 34 cases (89.5%) out of 38 cases sampled by FNNAC contain more cellular material. 4 cases (10.5%) out of 38 cases sampled by FNNAC contain less cellular material.

Table 3. Amount of cellular material

Amount of cellular material	FNAC		FNNAC	
	N	%	n	%
More cellular	14	36.80	34	89.50
Less cellular	24	63.20	4	10.50
Total	38	100.00	38	100.00

The difference was statistically significant(p= 0.000)

3.Retention of appropriate architecture

FNAC: 6 (15.8%) out of 38 cases sampled by FNAC contain better preservation of architecture. 32 (84.2%) out of 38 cases sampled by FNAC contain lesser preservation of architecture.

FNNAC: 33(86.8%) out of 38 cases sampled by FNNAC contain better preservation of architecture. 5 (13.2%) out of 38 cases contain lesser preservation of architecture.

Table 4. Retention of appropriate architecture

Retention of appropriate architecture	FNAC		FNNAC	
	N	%	n	%
Better preservation of architecture	6	15.80	33	86.80
Lesser preservation of architecture	32	84.20	5	13.20
Total	38	100.00		100.00

The difference in the two technique was statistically significant (p=0.000)

4.Amount of trauma

FNAC: 22 (57.9%) out of 38 cases sampled by FNAC had more trauma . 16(42.1%) out of 38 cases sampled by FNAC had less cellular trauma.

FNNAC: 14 (36.8%) out of 38 cases sampled by FNNAC had more trauma.24(63.2%) out of 38 cases sampled by FNNAC had less trauma.

Table5. Amount of trauma

Amount of trauma	FNAC		FNNAC	
	N	%	n	%
More trauma	22	57.90	14	36.80
Less trauma	16	42.10	24	63.20
Total	38	100.00	38	100.00

There was significant difference between the two technique (p=0.033).

THYROID LESIONS: The number of thyroid lesions sampled were 12.

1. Background of blood

FNAC:

More blood: 10 (83.3%) out of 12 cases sampled by FNAC contain more blood.

Less blood: 2 (16.7%) out of 12 cases sampled by FNAC contain less blood

FNNAC:

More blood: 1 (8.3%) out of 12 cases sampled by FNNAC contain more blood.

Less blood: 11 (91.7%) out of 12 cases sampled by FNNAC contain less blood.

Table 6. Background of blood

Background of blood	FNAC		FNNAC	
	N	%	n	%
More blood	10	83.30	1	8.30
Less blood	2	16.70	11	91.70
Total	12	100.00	12	100.00

This difference was statistically significant(p=0.000).

2. Amount of cellular material**FNAC:**

More cellular: 3 (25%) out of 12 cases sampled by FNAC contain more cellular material.

Less cellular: 9 (75%) out of 12 cases sampled by FNAC contain less cellular material.

FNNAC:

More cellular: 10(83.3%) out of 12 cases sampled by FNNAC contain more cellular material.

Less cellular: 2 (16.7%) out of 12 cases sampled by FNNAC contain less cellular material.

Table 7. Amount of cellular material

Amount of cellular material	FNAC		FNNAC	
	N	%	n	%
More cellular	3	25.00	10	83.30
Less cellular	9	75.00	2	16.70
Total	12	100.00	12	100.00

This difference was statistically significant($p=0.004$).

3.Retention of appropriate architecture**FNAC:**

Better preservation: 1 (8.3%) out of 12 cases sampled by FNAC showed better preservation of architecture.

Lesser preservation: 11 (91.7%) out of 12 cases sampled by FNAC showed lesser preservation of architecture.

FNNAC:

Better preservation of architecture: 10(83.3%) out of 12 cases sampled by FNNAC showed better preservation of architecture.

Lesser preservation of architecture: 2 (16.7%) out of 12 cases sampled by FNNAC showed lesser preservation of architecture.

Table 8. Retention of appropriate architecture

Retention of appropriate architecture	FNAC		FNNAC	
	N	%	n	%
Better preservation of architecture	1	8.30	10	93.30
Lesser preservation of architecture	11	91.70	2	16.70
Total	12	100.00	12	100.00

The difference was statistically significant($p=0.000$).

4.Amount of trauma**FNAC:**

More trauma: 8 (66.7%) out of 12 cases sampled by FNAC showed more trauma.

Less trauma: 4 (33.3%) out of 12 cases sampled by FNAC showed less trauma

FNNAC:

More trauma: 3 (25%) out of 12 cases sampled by FNNAC showed more trauma.

Less trauma: 9 (75%) out of 12 cases sampled by FNNAC showed less trauma.

Table 9. Amount of trauma

Amount of trauma	FNAC		FNNAC	
	N	%	n	%
More trauma	8	66.70	3	25.00
Less trauma	4	33.30	9	75.00
Total	12	100.00	12	100.00

This difference was statistically significant (p= 0.014)

Salivary gland lesions: The number of salivary gland lesions were sampled 7.

1. Background of blood

FNAC:

More blood: 5 (71.4%) out of 7 cases sampled by FNAC contain more blood.

Less blood: 2 (28.6%) out of 7 cases sampled by FNAC contain less blood.

FNNAC:

More blood: 1 (14.3%) out of 7 cases sampled by FNNAC contain more blood.

Less blood: 6 (85.7%) out of 7 cases sampled by FNNAC contain less blood.

Table10. Background of blood

Background of blood	FNAC		FNNAC	
	N	%	n	%
More blood	5	71.40	1	14.30
Less blood	2	28.60	6	85.70
Total		100.00	7	100.00

The difference is statistically significant(p =0.031).

2. Amount of cellular material:

FNAC:

More cellular: 5 (71.4%) out of 7 cases showed more cellular material sampled by FNAC.

Less cellular: 2 (28.6%) out of 7 cases showed less cellular material.

FNNAC:

More cellular: 1 (14.3%) out of 7 cases showed more cellular material sampled by FNNAC.

Less cellular: 6 (85.7%) out of 7 cases showed less cellular material.

Table 11. Amount of cellular material

Amount of cellular material	FNAC		FNNAC	
	N	%	n	%
More cellular	5	71.40	1	14.30
Less cellular	2	28.60	6	85.70
Total	7	100.00	7	100.00

This difference is statistically significant (p=0.031).

3. Retention of appropriate architecture:

FNAC:

Better preservation: 6 (85.7%) out of 7 cases sampled by FNAC showed better preservation of architecture

Lesser preservation: 1 (14.3%) out of 7 cases showed lesser preservation of architecture

FNNAC:

Better preservation : 2 (28.6%) out of 7 cases showed better preservation of architecture sampled by FNNAC

Lesser preservation:5 (71.4%) out of 7 cases showed less preservation of architecture.

Table 12. Retention of appropriate architecture

Retention of appropriate architecture	FNAC		FNNAC	
	N	%	n	%
Better preservation of architecture	6	85.70	2	28.60
Lesser preservation of architecture	1	14.30	5	71.40
Total	7	100.00	7	100.00

This difference was statistically significant (p=0.001).

4.Amount of trauma

FNAC:

More trauma: 4 (57.1%) out of 7 cases sampled by FNAC showed more trauma.

Less trauma: 3 (42.9%) out of 7 cases sampled by FNAC showed less trauma.

FNNAC:

More trauma: 1 (14.3%) out of 7 cases showed more trauma.

Less trauma: 6 (85.7%) out of 7 cases showed less trauma.

Table 13. Amount of trauma

Amount of trauma	FNAC		FNNAC	
	N	%	n	%
More trauma	4	57.10	1	14.30
Less trauma	3	42.90	6	85.70
Total	7	100.00	7	100.00

This difference was statistically significant (p=0.004).

Miscellaneous lesions: The number of miscellaneous lesions sampled were 5.

1.Background of blood

FNAC:

More blood: 4 (80%) out of 5 cases sampled by FNAC showed more blood.

Less blood: 1 (20%) out of 5 cases sampled by FNAC showed less blood.

FNNAC:

More blood: 2 (40%) out of 5 cases showed more blood

Less blood: 3 (60%) out of 5 cases showed less blood.

Table 14. Background of blood

Background of blood	FNAC		FNNAC	
	N	%	n	%
More blood	4	80.00	2	40.00
Less blood	1	20.00	3	60.00
Total	5	100.00	5	100.00

This difference was significant(p=0.002)

2.Amount of cellular material**FNAC:**

More cellular: 4(80%) out of 5 cases showed more cellularity sampled by FNAC

Less cellular: 1 (20%) out of 5 cases showed less cellularity sampled by FNAC

FNNAC:

More cellular: 2 (40%) out 5 cases showed more cellularity

Less cellular: 3 (60%) out of 5 cases showed less cellularity

Table 15. Amount of cellular material

Amount of cellular material	FNAC		FNNAC	
	N	%	n	%
More trauma	4	80.00	2	40.00
Less trauma	1	20.00	3	60.00
Total	5	100.00	5	100.00

This difference was statistically significant (p=0.004)

3.Retention of appropriate architecture**FNAC:**

Better preservation: 3 (60%) out of 5 cases sampled by FNAC showed better preservation of architecture.

Less preservation: 2 (40%) out of 5 cases sampled by FNAC showed less preservation of architecture.

FNNAC:

Better preservation: 2 (40%) out of 5 cases showed better preservation of architecture

Less preservation: 3 (60%) out of 5 cases showed lesser preservation of architecture

Table 16. Retention of appropriate architecture

Retention of appropriate architecture	FNAC		FNNAC	
	N	%	n	%
Better preservation	3	60.00	2	40.00
Lesser preservation	2	40.00	3	60.00
Total	5	100.00	5	100.00

This difference was statistically significant (p=0.003)

4.Amount of trauma**FNAC:**

More trauma: 4 (80%) out of 5 cases showed more trauma sampled by FNAC

Less trauma: 1 (20 %) out of 5 cases showed less trauma sampled by FNAC

FNNAC:

More trauma : 3 (60%) out of 5 cases showed more trauma sampled by FNNAC

Less trauma: 2 (40%) out of 5 cases showed less trauma sampled by FNNAC

Table no17. Amount of trauma

Amount of cellular trauma	FNAC		FNNAC	
	N	%	n	%
More trauma	4	80.00	3	60.00
Less trauma	1	20.00	2	40.00
Total	5	100.00	5	100.00

This difference was statistically significant(p=0.002).



Fig 1 : PROCEDURE OF FNAC



Fig 2 : PROCEDURE OF FNNAC

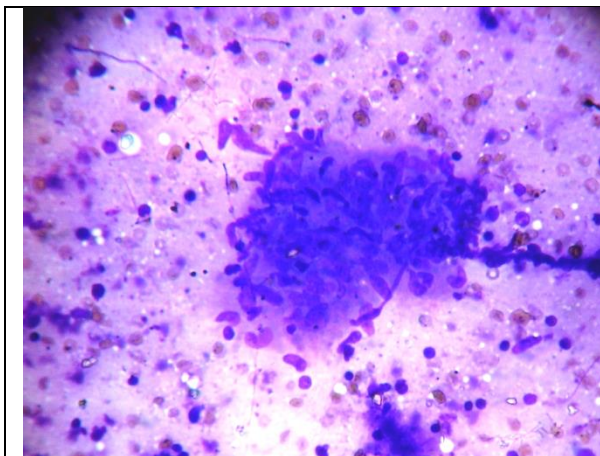


Fig 3 : FNAC-PHOTOMICROGRAPH OF A CASE OF TUBERCULOUS LYMPHADENITIS-GRANULOMA COMPRISING OF EPITHELIOID HISTIOCYTES,LYMPHOCYTES IN A BACKGROUND OF NECROSIS (MGG STAIN 40X)

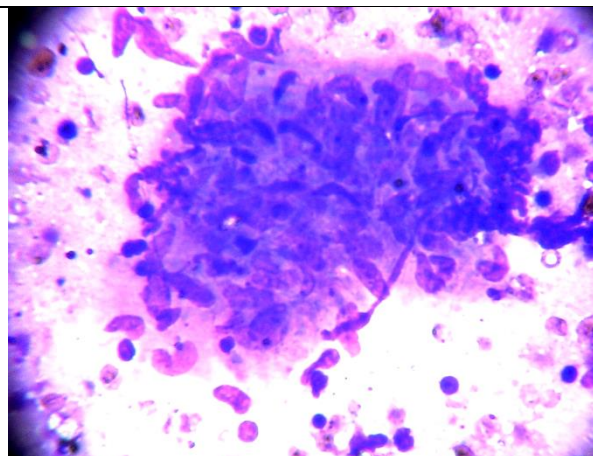


Fig 4 : FNNAC-PHOTOMICROGRAPH OF TUBERCULOUS LYMPHADENITIS-GRANULOMA COMPRISING OF EPITHELIOID HISTIOCYTES AND LYMPHOCYTES (MGG STAIN 40X)

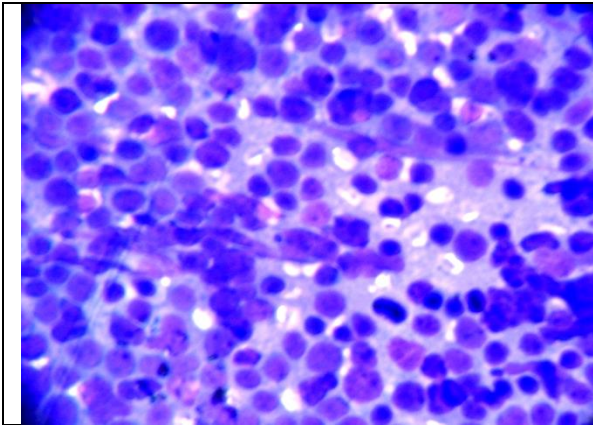


Fig 5 : FNAC OF REACTIVE LYMPHADENITIS -POLYMORPHOUS POPULATION OF LYMPHOID CELLS (MGG 40X)

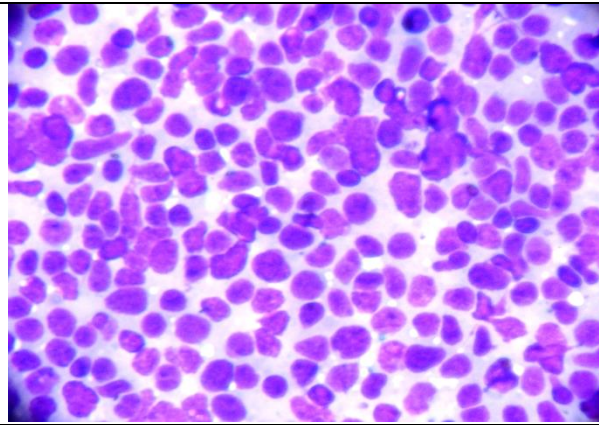


Fig 6 : FNNAC OF REACTIVE LYMPHADENITIS -POLYMORPHOUS POPULATION OF LYMPHOID CELLS (MGG 40X)

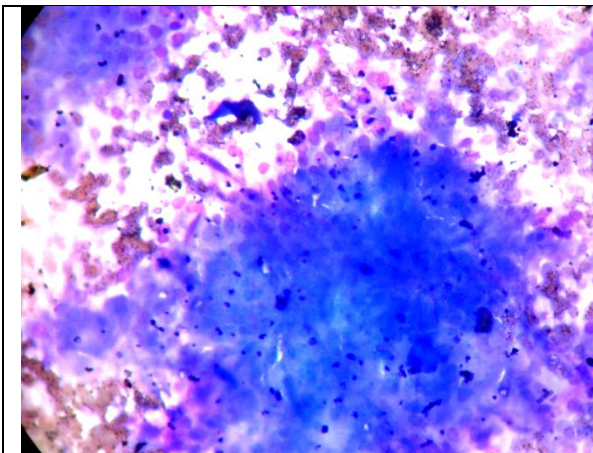


Fig 7 : FNAC-PHOTOMICRGRAPH OF FOLLICULAR NEOPLASM (MGG STAIN 40X)

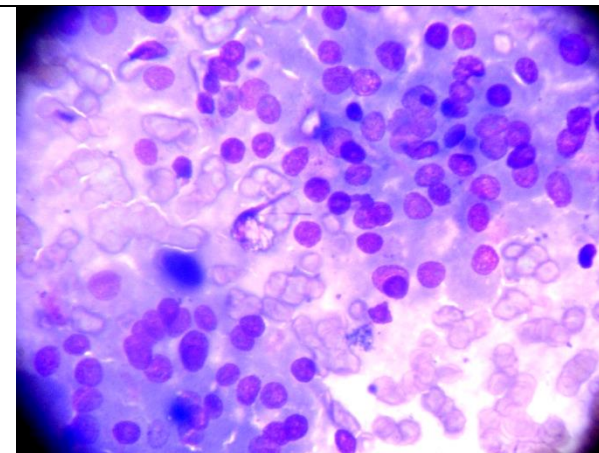


Fig 8 : FNNAC-PHOTOMICROGRAPH OF FOLLICULAR NEOPLASM WITH MICROFOLLICLES (MGG STAIN 40X)

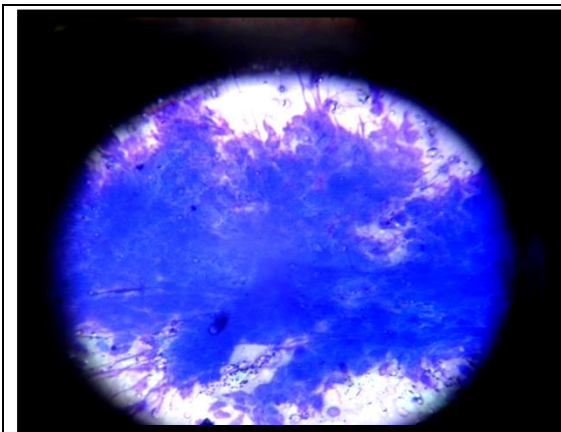


Fig 9 : FNAC-PHOTOMICROGRAPH OF PLEOMORPHIC ADENOMA : MYOEPIHELIAL CELLS AND FIBROMYXOID STROMA (MGG 40X)

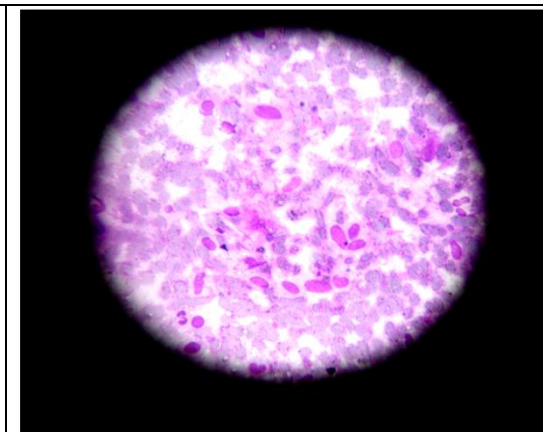


Fig 10 : FNNAC-PHOTOMICROGRAPH OF PLEOMORPHIC ADENOMA (MGG 40x)

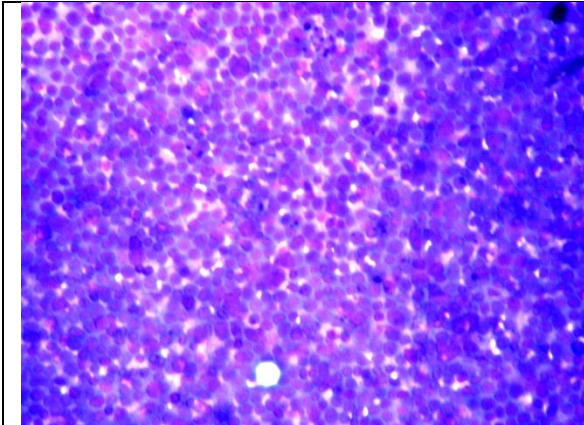


Fig 11 : FNAC- PHOTOMICROGRAPH OF NON HODGKIN LYMPHOMA: MONOTONOUS POPULATION OF LYMPHOID CELLS (MGG 40X)

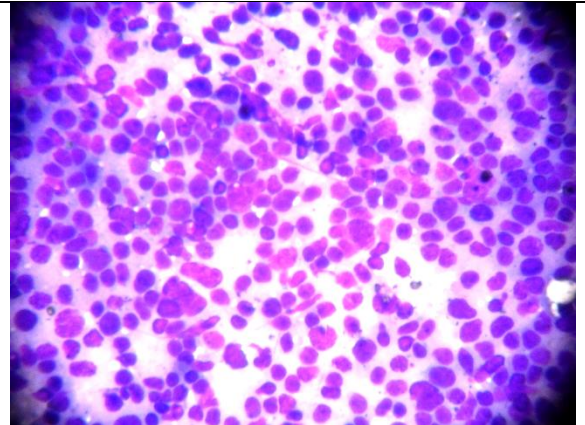


Fig 12 : FNNAC- PHOTOMICROGRAPH OF NON HODGKIN LYMPHOMA: MONOTONOUS POPULATION OF LYMPHOID CELLS (MGG 40X)

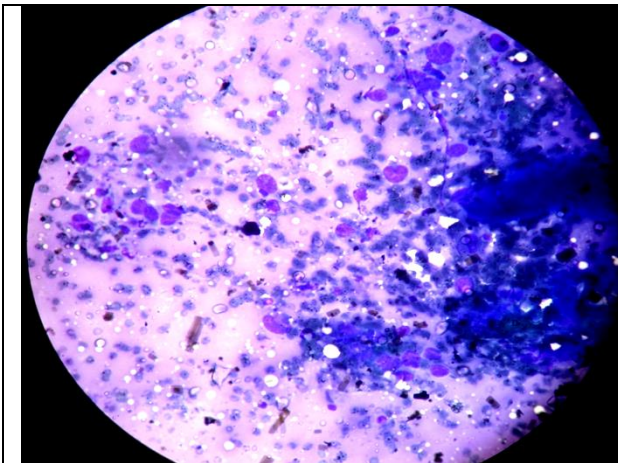


Fig 13 : FNAC-PHOTOMICROGRAPH OF METASTATIC ADENOCARCINOMA (MGG 40x)

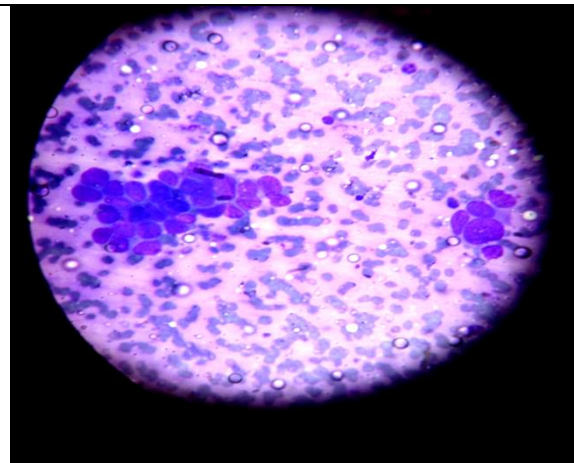


Fig 14 : FNNAC- PHOTOMICROGRAPH OF METASTATIC ADENOCARCINOMA : SHEET OF TUMOUR CELLS WITH ROUND TO OVAL HYPERCHROMATIC NUCLEI AND MODERATE AMOUNT OF CYTOPLASM (MGG 40x)

Discussion: FNAC is accepted as first line of investigation for palpable masses of the head and neck. The present study was undertaken to assess the efficacy of the fine needle non-aspiration cytology in the diagnosis of head and neck masses, and to debate the need for both techniques in every case.

In the present study of 62 aspirates from head and neck swellings, the largest group was lymph node comprising of 61.30% of cases followed by thyroid 19.40% of cases, salivary glands 11.3% of cases and miscellaneous 8.30 cases.

In a study by Misra R.K et al. conducted in the year 2000, similar distribution of lesions was found. In their study, lymph nodes constituted 63% of cases, thyroid 16.3%, salivary glands 6.3% and miscellaneous lesions 6.3% of all the cases.

Lymph node: In the present study, FNNAC was better for lymph node lesions with respect to all the parameters. Statistically significant difference was noted in background of blood, amount of cellular material, retention of appropriate architecture and amount of trauma.

Same results were noted by Akhtar SS et al, Cajulis RS and Sneige N in their study.

Thyroid: For thyroid lesions, FNNAC technique was better than the aspiration technique in all parameters. The difference was statistically significant.

Similar results were noted in the studies by Ghosh A et al and Kamal M.M et al.

Salivary gland: The aspiration technique yielded more cellular material with good preservation of architecture. The amount of background blood was considerably less in the non-aspiration technique with a statistically difference. The amount of trauma was less in non-aspiration technique. 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. Similar results were seen in the study by Mishra RK et al and Mair et al.

Miscellaneous: In the present study included 5 miscellaneous lesions, which comprised of 2 squamous cell carcinoma, 1 inflammatory lesion, 1 epidermal cyst and 1 case of lipoma.

In the present study less blood contamination was seen in the non aspiration technique, while better cellularity was seen in the aspiration technique. Retention of appropriate architecture was better in aspiration techniques. Similar results were obtained in the study by Mishra RK et al.

In the epidermal cyst, the aspiration technique was better as the cyst contents could be completely aspirated. In the non aspiration technique scanty cellular material was obtained.

Conclusion: In all the swellings of the head and neck, blood contamination was comparatively reduced in FNNAC. In lymph node and thyroid swellings FNNAC provided more cellular samples with good preservation of architecture. In salivary gland and miscellaneous swellings FNAC is a better technique. There was no difference in the two techniques in producing trauma.

In cystic and fibrotic swelling FNAC is a better technique than FNNAC. In cellular lesions, FNNAC provides superior quality samples.

FNNAC is a simple procedure, easy to learn and follow. It gives better perception of the consistency and depth of the tumour.

The ultimate purpose of FNAC/FNNAC is to diagnose a lesion and thereby guides the clinician in selecting the appropriate treatment.

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