

**“COMPARISON OF FINE NEEDLE ASPIRATION AND FINE
NEEDLE NON ASPIRATION CYTOLOGY IN HEAD AND NECK
SWELLINGS”**

By

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BLDE University, Vijayapur, Karnataka**



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DOCTOR OF MEDICINE

IN

PATHOLOGY

Under the Guidance of

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ॐ श्री साई नाथाय नमः,

ॐ श्री साई सच्चिदात्मने नमः

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ABSTRACT

INTRODUCTION:

Fine needle aspiration cytology (FNAC) is well-established first line of investigation used in diagnosis of head and neck swellings. It was thought that FNAC can cause trauma leading to alteration in cell morphology and also negative pressure applied during aspiration leads to bloody aspirates in highly vascular organs. Hence technique of FNAC has undergone various modifications. In 1981 a new modified technique of FNAC called as fine needle non aspiration cytology (FNNAC) was introduced.

OBJECTIVES:

To access efficacy of FNNAC technique in cytodagnosis of head and neck swelling by comparing cytomorphological features of FNNAC with FNAC.

RESULTS:

Ninty cases of head and neck swellings were studied by FNAC and FNNAC for five objective parameters, amount of background blood, amount of cellular material, retention of architecture, cellular degeneration and trauma, using Mair's point scoring system. Based on this scoring system head and neck lesions were categorized under 3 groups such as unsuitable for diagnosis (score 0- 2), adequate for cytodagnosis (score 3-6), diagnostically superior (score 7-10). On the basis of these scores in thyroid lesions in FNAC technique out of 47 cases 10 cases (21.3%) were diagnostically superior, 21 cases (44.7%) were diagnostically adequate and 16 (34%) cases were insufficient for diagnosis. In FNNAC out of 47 cases 31 cases (66.6%) were diagnostically superior, 15 cases (31.9%) were diagnostically adequate and 1 case (2.1%) was insufficient for diagnosis. In lymph-node lesions in FNAC technique

out of 31 cases 30 cases (96.8%) were diagnostically superior, 1 case (3.2%) was diagnostically adequate whereas in FNNAC of lymph node out of 31 cases 25 cases (80.6%) were diagnostically superior and 6 cases (19.4%) were diagnostically adequate. In salivary gland FNAC out of 6 cases 5 cases (83.3%) were diagnostically superior, 1 case (16.7%) was diagnostically adequate. In FNNAC all 6 cases 100% were diagnostically superior.

CONCLUSION: Greater number of diagnostically superior cases were obtained by FNNAC in thyroid lesions. However lesser no of diagnostically superior were obtained in lymph- node lesions by FNNAC. Thus FNNAC technique was better than FNAC in thyroid lesions whereas in lymph node lesions FNAC technique was better as compared to FNNAC.

KEY WORDS: FNAC, FNNAC, Head and neck lesions, Lymph node, Thyroid, Salivary gland.

LIST OF ABBREVIATIONS USED

| | |
|----------------|-------------------------------------|
| FNAC | Fine needle aspiration cytology |
| FNNAC | Fine needle non aspiration cytology |
| FNCS | Fine needle capillary sampling |
| MGG | May Grunwald-Giemsa |
| PAP | Papanicolaou |
| S.D | Standard deviation |
| P value | Probability value. |

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INTRODUCTION

Head and neck masses are the commonest lesions for aspiration cytology. Variety of lesions including both neoplastic and non-neoplastic lesions may occur in head and neck region. Fine needle aspiration cytology (FNAC) is a well-established first line of investigation used in the diagnosis of head and neck swellings. It is thought that FNAC can cause trauma leading to alteration in cell morphology and also negative pressure applied during aspiration leads to bloody aspirate in highly vascular organs like thyroid. Hence technique of FNAC has undergone various modifications.^{1,2}

In 1981 a new modified technique of FNAC called as fine needle non aspiration cytology (FNNAC) has been introduced which is also called as fine needle capillary sampling, cytopuncture, non-aspiration fine needle cytology and fine needle sampling without aspiration.¹

FNNAC was first used in France for breast tumors and later for peri-orbital tumors. It is a simple procedure and has gained popularity nowadays for its various advantages and is used widely in various centers and produce superior quality specimens.³

Both FNAC and FNNAC techniques are safe, simple, economical, accurate and minimally invasive procedure and has contributed in avoiding a large number of unnecessary surgeries.²

Various authors did study to compare aspiration and non-aspiration technique in cytodiagnosis of thyroid lesion.^{3, 4} However literature search revealed very few studies on comparative study of FNAC and FNNAC technique in head and neck swellings.¹ Hence the present study was undertaken to access the efficacy of FNNAC in cytodiagnosis of head and neck swellings.

OBJECTIVE OF THE STUDY

- To assess the efficacy of FNNAC technique in cytodagnosis of head and neck swellings by comparing cytomorphological features of FNNAC smears with FNAC smears.

REVIEW OF LITERATURE

The idea to obtain cell through needle was introduced in 1847 by the French physician Kun. He described a new instrument for diagnosing palpable tumours.⁵ In 1883 Leyden used the needle aspiration technique to isolate pneumonic microorganisms. Then in 1886 Mentetrier applied needle aspiration cytology for the diagnosis of lung carcinomas. In 1904, Griegg and Grey applied this technique on swollen lymph nodes with the help of syringe and needle and diagnosed trypanosomiasis in sleeping sickness cases in Uganda, Africa.⁵

Very few pathologists were encouraged by this work and only few clinicians used this technique. Later in 1927 Dudgeon and Patrick from U.K, had published their first paper on FNAC. In their study they proposed that aspiration cytology help in rapid diagnosis of tumours. Within a few years, Hayes E Martin, a surgeon, and Edward B Eliis, the histotechnologist at the memorial Sloan- Kettering cancer hospital in USA published their paper on diagnosis of tumours by FNAC. Later Fred W Stewart published his paper by compiling and analysing all the cases of cytology smears. James Ewing, and many clinicians were of the opinion that aspiration cytology can spread the cancer through needle tract seeding. Hence this technique generated no interest among the other clinicians and pathologist in USA. However, many European countries like Sweden, Holland, France has used this Fine needle aspiration technique. Later this technique became popular and accepted by other countries like Asia and Australia.⁵ Martin and Ellis in 1930 described FNAC procedure for diagnosis of tumours by cytomorphology. In their study they concluded that FNAC procedure can be used as a first line of diagnostic procedure in evaluating palpable thyroid lesions.⁶

FNAC was introduced in India by M.S Sukumaran in Madras and by Subhashkumari Gupta in PGIMER Chandigarh, in the early 1970 after completion of their training in Scandinavia.⁷

FNAC since its inception has passed through phases of skepticism and enthusiasm.² FNAC is widely accepted as the primary method for diagnosis of thyroid lesions. However cytologist faced the common problem of hemorrhagic material from thyroid FNAC. To overcome the problems of hemorrhagic aspirate of vascular organs, FNNAC technique was developed by Brifford in France by in 1982.^{4,7,9}

A special syringe holder was introduced to improve the technique of FNAC and FNNAC. This syringe holder is called as cameco syringe pistol or aspiration gun.¹⁰ This instrument can hold 10ml or 20ml of disposable plastic syringe, this gun gives a good grip and make the aspiration easy. To overcome the problems faced by syringe holders Chang Tien Chung has described the brush holding technique.¹⁰

Few studies were done to compare the two techniques using all lengths and diameters of biopsy needles.¹¹ For FNAC thin needles having 0.6-1.0mm diameter 22/23/25 or 27 gauge needles with 1.5cm length were used for the perfection of aspiration biopsy. In some studies Franseen needles having notched tip and styles were also used, which also helps in procuring small micro core of tissue.¹² In studies where Radiologists did FNAC they used the Chiba needles of 21 and 22 gauge for transthoracic and transabdominal aspirations. Milex and Inrad needles were referred as side port needles, both had slot on the side and these needles produce more discomfort but greater volume of aspirate. Some studies mentioned that the larger the diameter of the needle greater the likelihood of complication with the needle biopsy.¹²

Zajdela *et al*¹³ in 1987 did a study on cytomorphological features of breast tumours by FNNAC. These authors documented their experience of FNNAC in breast lumps by doing study of large series of mammary tumours. They did the comparison of cytomorphological features of the smears prepared by FNAC and FNNAC. However in their study these technique were not used together on the same tumours or same patient population.

Some authors opined that precise entry into the mass was possible with fine needle cytology non-aspiration technique as compared to FNAC. They also found that FNNAC technique can minimize injury to the organs such as eyeball and trachea.^{13,14,15}

Mair *et al*¹⁶ in 1988 first proposed a point scoring system for comparison of cytomorphological features in FNAC and FNNAC smears using five objective 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 0 to 2 score was given and cumulative score was calculated. Based on cumulative score of all parameters which varied between 0 to 10 points, three categories were done. These authors then assigned each case to one of the 3 categories. In category 1 score varied from 0 to 2, these cases were categorised as unsuitable for diagnosis. In category 2 score was between 3 to 6 which were categorised as adequate for cytological diagnosis and category 3 having score between 7 to 10 were considered as diagnostically superior. In their study they observed that the aspiration technique scored higher than the non-aspiration technique in each subcategory of organ. Though more aspiration samples were diagnostic, there was no significant difference between them.

Santos and Leiman¹⁷ in 1988 did exhaustive study of FNAC and FNNAC in thyroid lesions. They found that blood cannot be entirely prevented in thyroid cytology, however FNNAC smears were less obscured by blood as compared to FNAC smears. They concluded that FNNAC is diagnostically superior as compared to FNAC in thyroid lesions.

K McElvanna *et al*¹⁸ in 2009 did the study on 70 patients with thyroid swellings and grading system of C0 TO C5 was used in the cytological interpretation of specimen. C0 was graded as no thyroid follicular cells, C1 was graded as less than 6 groups of follicular cells. C2 was graded as benign with more than 6 groups of follicular cells, no neoplastic features. C3 was graded as equivocal- hyperplastic nodule or follicular neoplasm. C4 was graded as atypia, suspicious for malignancy. C5 was graded as malignant. C0 and C1 were cytologically inadequate. C2 suggests a benign non-neoplastic lesion. C3 was equivocal, suggestive of either a cellular colloid nodule or follicular neoplasm and excision is therefore advised. In clinical practice a grading of C3-5 requires thyroid surgery. They observed that adequacy of material was better in FNNAC as compared to FNAC. They also concluded that for predicting malignancy both the techniques were equally sensitive but fine needle aspiration has higher specificity and accuracy.

Mahajan P *et al*¹¹ in 2010 did the study on 50 patients with enlarged thyroid gland by fine needle aspiration verses non-aspiration technique. Their study was based on scoring as that was done by Mair *et al*.¹⁶ They tabulated cumulative score between 0 to 10 points obtained for each specimen which were categorised into Category 1 to 3 as per the Mair *et al*.¹⁶ They observed that greater number of diagnostically adequate samples were obtained by FNAC than by FNNAC and

diagnostically superior with FNNAC. The percentage of inadequate samples were more with non- aspiration than with aspiration.

Maurya AK *et al*⁴ in 2007 did the study on 50 cases of thyroid lesions and concluded that greater number of diagnostically superior samples were obtained by FNNAC, however by FNAC more diagnostically adequate smears were observed.

Ramachandra L.*et al*³ in 2011 did a prospective study on 69 patients in thyroid lesions. They observed that FNNAC yielded more diagnostically better material as compared with FNAC. The unsuitable smears were also greater in FNAC.

Al- Metwally R. Ibrahim *et al*¹⁹ in 2012 studied 50 cases of thyroid lesions. All the samples in their study were assessed and evaluated using five parameters as per the study done by Mair *et al.*¹⁶ According to their study observation non- aspiration technique yielded less diagnostically adequate but more diagnostically superior cases when compared with aspiration technique. Non-aspiration technique yielded more cellular material, lesser cellular trauma, better retention of architecture and less background blood than aspiration technique.

Tauro LF *et al*²⁰ in 2012 did the prospective study of 50 cases in thyroid nodules. The diagnostic performances of both the techniques indicated that FNAC yielded more diagnostically superior cases than FNNAC, whereas FNNAC yielded more adequate cases than FNAC. Moreover they got half the number of diagnostically unsuitable cases with FNAC compared to FNNAC.

Malik NP *et al*²¹ in 2013 also did a study on 144 patients who presented with thyroid swellings. All the patients in their study were subjected to both FNAC and FNNAC. On comparing both the techniques, the FNAC technique in their study yielded more diagnostically superior results. The non-aspiration technique yielded

more diagnostically adequate results and unsuitable cases in their study by both the techniques were nearly same.

Jian-qiao Zhou *et al*⁸ in April 2014 did a prospective study on 275 patients of thyroid lesions. In their study both fine needle aspiration and fine needle capillary sampling was done with the help of USG by radiologists. By using four parameters they observed that better architecture, less background blood, more cells, lesser cellular degeneration were obtained in FNAC than in FNNAC.

Chowhan AK *et al*⁷ in 2014 did a prospective study in 200 cases of thyroid lesions. In their study two experienced pathologists studied and scored the smears and an average of the two was taken as final score, thereby eliminating the inter-observer bias. They concluded that non- aspiration technique yielded less diagnostically adequate but more diagnostically superior cases when compared with aspiration technique.

Kaur S. *et al*⁹ in 2014 did a study in 88 cases of thyroid lesions. In their study more diagnostically superior and less diagnostically adequate sample were obtained more by non- aspiration in comparison to aspiration technique.

Purushotham K *et al*²² in their study on “Cytological evaluation of thyroid lesions by fine needle aspiration versus non-aspiration cytology techniques” concluded that FNNAC is a better technique than FNAC.

In a study conducted by Bharathi K *et al*²³ by comparative study of two techniques in 100 cases of lymph nodes found that the diagnostic adequacy of FNAC was more as compared to FNNAC. They concluded that FNAC is better technique for aspirating lymph nodes as compared to FNNAC. They also concluded that FNAC allows the distinction between non-neoplastic and neoplastic conditions and helps the

clinician to decide the management. They also concluded that the sample collected by FNC can be used for microbiological and biochemical analysis and thus is also valuable in infections. Fine needle cytology is readily repeatable and as a preliminary investigation it can reduce hospitalization period and avoid overcrowding in hospitals.

Garg M. *et al*²⁴ did a study on “Comparative and Evaluative study of Fine needle aspiration versus capillary sampling techniques in superficial lymph-nodes. They observed that except for amount of cellular material, all other parameters were better in non-aspiration and difference was statistically significant in background blood and degree of cellular degeneration. Hence more diagnostically superior and less diagnostically adequate smears were obtained by non-aspiration technique.

Koirala S.²⁵ did a hospital based analytical study in 45 patients with clinically palpable breast lumps. He observed that more diagnostically superior cases were obtained by FNNAC when compared with FNAC and more diagnostically adequate by FNAC.

Misra RK *et al*¹⁴ carried out the study on “Image guided fine needle cytology with aspiration versus non-aspiration in retroperitoneal masses: Is aspiration necessary? In their study FNAC produced greater number of diagnostically adequate smears and FNNAC produced greater number of superior smears, however the difference was statistically insignificant.

Dey P *et al*³⁰ in their study mentioned that the diagnostic accuracy of FNAC in the head and neck region depends largely on the operator and interpreter’s experience in this field along with the use of ancillary techniques. In their study they also observed that the maximum diagnostic accuracy was obtained when the same person performs FNAC and also reports the smears.

Maximum studies on comparison of FNAC and FNNAC technique have been done in thyroid and very few studies in lymph-node, breast, salivary gland lesions and retroperitoneum. These authors were of the opinion that both the techniques have their own merits and demerits and neither is superior to the other. By combining both the techniques, better diagnostic accuracy can be achieved. However FNNAC technique is easier to perform with better patient compliance. Other advantages of FNNAC are, absolute control over operating hand and allow a better perception of lesions^{11,14,20,23-29}

MATERIALS AND METHODS

Source of data:

Patients presented with swellings in head and neck region for cytological evaluation in the cytology section of the Department of pathology in BLDEU'S Shri B.M.Patil Medical College, Hospital and Research Centre, Vijyapur Study period: 1st December 2014 to 30th June 2016.

Method of collection of data:

Thorough examination of the patients who have been referred to the Department of pathology for cytological evaluation of head and neck swellings was done and also detailed clinical history was taken. The procedure was explained carefully to the patient and it was carried out under aseptic precautions. For all cases FNNAC procedure was performed first by using 22-24 gauge needle. Needle was held directly with the fingers and inserted into the target tissue and moved back and forth in several directions for 5 to 10 seconds and then withdrawn. Aspirate flows into the needle through capillary action. Next the plunger was used to expel the material onto the glass slides. Smears were prepared by using another glass slide by applying gentle and uniform pressure. FNNAC was followed by standard FNAC procedure by using Cameco syringe pistol with 10 ml disposable syringe and 22-24G needle by the same person. One to two needle passes were done for each of the two techniques. Three slides were prepared separately for each of the techniques. Two smear from each technique were fixed in 95% ethanol and then stained with Papanicolaou stains and haematoxylin and Eosin stain. One Air dried smear from each technique was stained with May-Grunwald Giemsa (MGG) stain. 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.

METHOD ANALYSIS

All the smears prepared by both FNAC and FNNAC techniques were analyzed as per the Mair *et al*¹⁶ point scoring system.

The smears were assigned to one of these 3 categories based on their total score.

Category 1- Unsuitable for diagnosis (0-2)

Category 2- Adequate for diagnosis (3-6)

Category 3- Diagnostically superior (7-10)

TABLE 1: POINT SCORING IN FNAC AND FNNAC

| <u>Criterion</u> | <u>Quantitative description</u> | <u>Point score</u> |
|---------------------------------------|------------------------------------------------------------------------------------------------------------------------|---------------------------|
| Background blood or clot | 1. Large amount ; great compromise to diagnosis | 0 |
| | 2. Moderate amount; diagnosis possible | 1 |
| | 3. Minimal ; diagnosis easy; specimen of textbook quality | 2 |
| Amount of cellular material | 1. Minimal to absent, diagnosis not possible | 0 |
| | 2. Sufficient for cytodiagnosis | 1 |
| | 3. Abundant; diagnosis simple | 2 |
| Degree of cellular degeneration | 1. Marked ;diagnosis impossible | 0 |
| | 2. Moderate; diagnosis possible | 1 |
| | 3. Minimal ;good preservation, diagnosis easy | 2 |
| Degree of cellular trauma | 1. Marked ; diagnosis not possible | 0 |
| | 2. Moderate ; diagnosis possible | 1 |
| | 3. Minimal ; diagnosis obvious | 2 |
| Retention of appropriate architecture | 1. Minimal to absent ; not diagnostic | 0 |
| | 2. Moderate ; some preservation for example follicles, papillae, acini, flat sheets , syncytia or single cell patterns | 1 |
| | 3. Excellent architectural display closely reflecting histology diagnosis obvious | 2 |

Sample Size:

According to a study done by Bharathi *et al*²³ in a “prospective study to compare the aspiration and non-aspiration techniques in fine- needle cytology of lymph node and to evaluate the diagnostic accuracy of aspiration cytology in lymph node lumps” the number of cases found to be diagnostically adequate in FNAC and FNNAC were 95.3 and 81.4%.

Considering the population proportion of adequacy of FNAC and FNNAC is 88.35 at 95% confidence limit and 80% power the calculated sample size was 84.

$$n = \frac{(z_1 + z_2)^2 \times 2 \times p \times (1 - p)}{d^2}$$

Z_1 = Z value for level is 95%

Z_2 = z value for level is 80%.

p= average proportion between 2 groups is 88.35

d= difference between two groups.

Hence to compare FNAC and FNNAC technique 90 samples were included in this study.

Statistical analysis:

Data was analyzed using-

- Diagrammatic presentation.
- Percentage of various cyto-morphological lesions in thyroid, lymph node, salivary gland and miscellaneous groups.
- All characteristics were summarized descriptively. For continuous variables, the summary statistics of N, mean, standard deviation (SD) were used. For categorical data, the number and percentage were used in the data summaries.

Chi-square (χ^2) test was employed to determine the significance of differences between groups for categorical data. The difference of the means of analysis variables was tested with the unpaired t-test. If the p-value was < 0.05 , then the results will be considered to be significant.

- Data were analyzed using SPSS software v.24.0.

Inclusion criteria:

Cases of head and neck swellings for which both FNAC and FNNAC technique was done were included.

Exclusion criteria:

Cases of head and neck swellings for which inadequate material was obtained by both FNAC and FNNAC technique were excluded.

OBSERVATION AND RESULTS

Total number of cases included in the study were 90 with a male to female ratio of 1:1.4 and maximum number of cases were in the age group of 16-30 years accounting to 46.7%.

TABLE 2: DISTRIBUTION OF CASES BY AGE AND SEX-

| Age (Yrs.) | Male | | Female | | Total | |
|------------|------|--------|--------|--------|-------|--------|
| | N | % | N | % | N | % |
| 0-15 | 6 | 15.8% | 0 | 0.0% | 6 | 6.7% |
| 16-30 | 17 | 44.7% | 25 | 48.1% | 42 | 46.7% |
| 31-45 | 6 | 15.8% | 16 | 30.8% | 22 | 24.4% |
| 46-60 | 7 | 18.4% | 9 | 17.3% | 16 | 17.8% |
| >60 | 2 | 5.3% | 2 | 3.8% | 4 | 4.4% |
| Total | 38 | 100.0% | 52 | 100.0% | 90 | 100.0% |

Note *significant at 5% level of significance

FIGURE 1: BAR DIAGRAM SHOWING DISTRIBUTION OF CASES BY AGE AND SEX

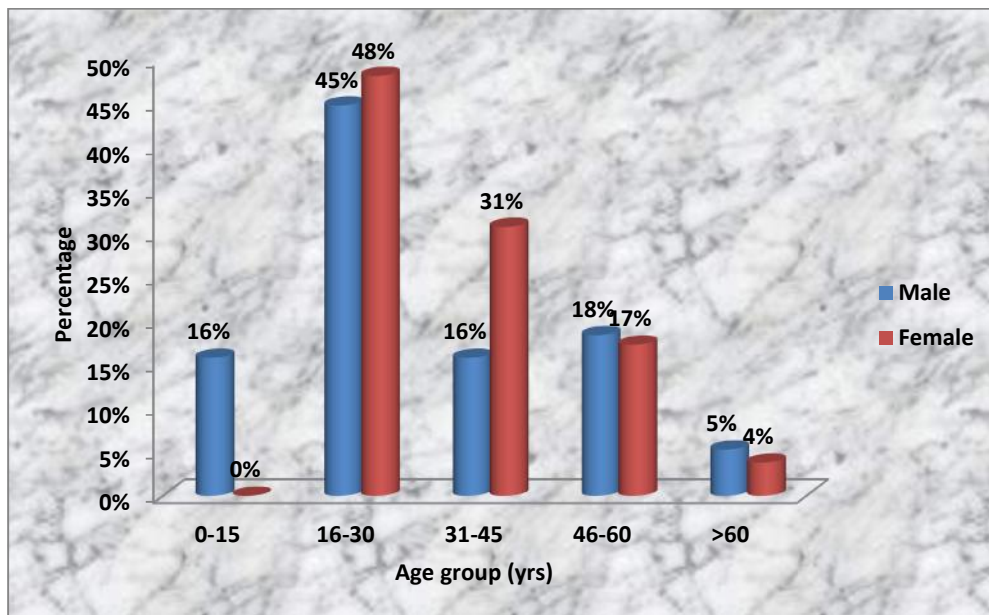


TABLE 3: SITE WISE DISTRIBUTION OF HEAD AND NECK LESIONS-

| SITE | N | Percent |
|-----------------------|-----------|----------------|
| Lymph-node | 31 | 34.4 |
| Salivary gland | 6 | 6.7 |
| Thyroid | 47 | 52.2 |
| Miscellaneous | 6 | 6.7 |
| Total | 90 | 100 |

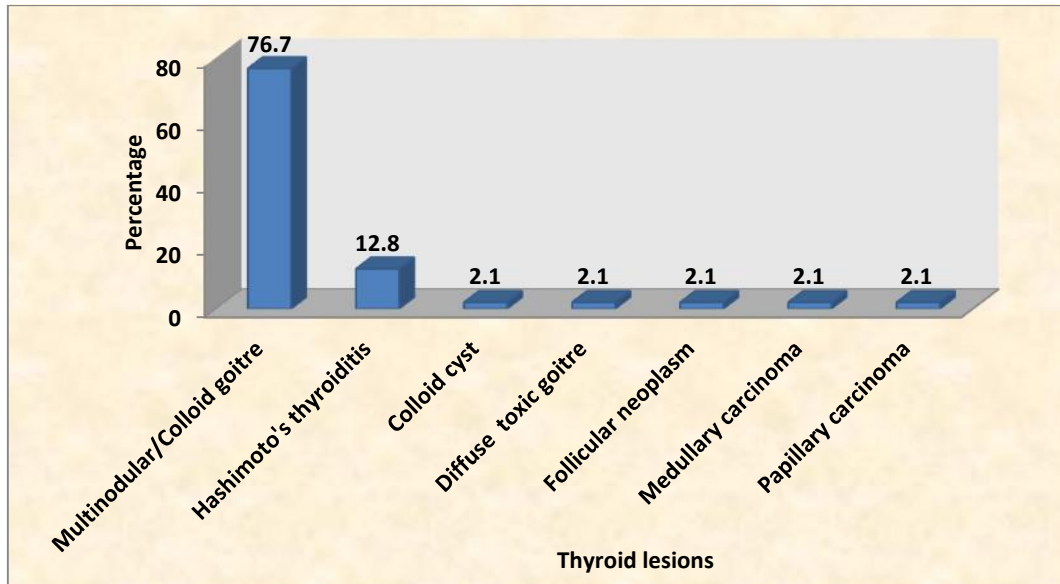
Out of 90 cases 47 cases were of thyroid amounting to 52.2% followed by 31 cases of lymph-node amounting to 34.4%. In both miscellaneous group and in salivary gland each of 6 cases (6.7%) of lesions were studied.

TABLE 4: FREQUENCY OF VARIOUS THYROID LESIONS- (n=47)

| Diagnosis | N | Percent |
|-----------------------------|----------|----------------|
| Multinodular/Colloid goitre | 36 | 76.7 |
| Hashimoto's thyroiditis | 6 | 12.8 |
| Colloid cyst | 1 | 2.1 |
| Diffuse toxic goitre | 1 | 2.1 |
| Follicular neoplasm | 1 | 2.1 |
| Medullary carcinoma | 1 | 2.1 |
| Papillary carcinoma | 1 | 2.1 |
| Total | 47 | 100 |

The number of thyroid lesions sampled were 47. Out of these 47 cases 36 cases (76.6 %) were multinodular goitre/ colloid goitre, 1 case each of (2.1%) colloid cyst and diffuse toxic goitre, 6 cases of (12.7) hashimoto's thyroiditis and one case each of (2.1%) papillary, medullary and follicular carcinoma.

FIG 2: BAR DIAGRAM SHOWING FREQUENCY OF THYROID LESIONS-



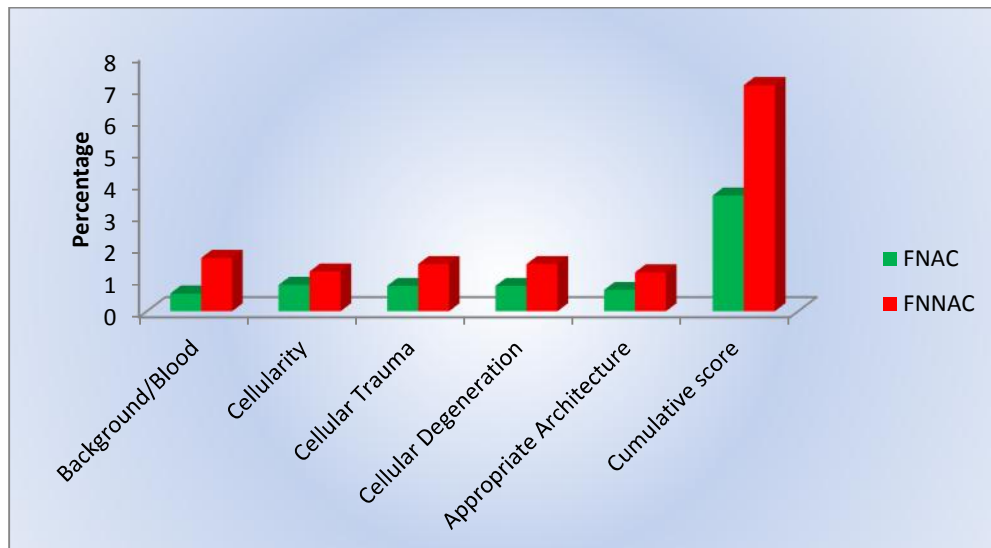
MULTINODULAR GOITRE/COLLOID CYST/DIFFUSE TOXIC GOITRE

TABLE 5: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF MULTINODULAR GOITRE/COLLOID CYST/DIFFUSE TOXIC GOITRE FOR DIFFERENT PARAMETERS: (n=36+1+1)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 21 | 0.55±0.50 | 63 | 1.66±0.48 | <0.001* |
| Cellularity | 31 | 0.82±0.46 | 47 | 1.24±0.49 | <0.001* |
| Cellular Trauma | 30 | 0.79±0.70 | 56 | 1.47±0.51 | <0.001* |
| Cellular Degeneration | 30 | 0.79±0.70 | 56 | 1.47±0.51 | <0.001* |
| Appropriate Architecture | 25 | 0.66±0.48 | 46 | 1.21±0.47 | <0.001* |
| Cumulative scores | 137 | 3.61±2.56 | 268 | 7.05±1.75 | <0.001* |

*significant at 5% level of significance

FIG 3- BAR DIAGRAM SHOWING SCORES OBTAINED BY FNAC AND FNNAC OF MULTINODULAR GOITRE/COLLOID CYST/DIFFUSE TOXIC GOITRE FOR DIFFERENT PARAMETERS:



Background blood or clot was more in FNAC than in FNNAC smears. Out of 38 cases 23 cases (60.52%) had a score of 2 in FNNAC, while in FNAC no case had a score of 2. In FNAC 19 cases had zero score while none of the FNNAC smears showed zero score. The total score in FNAC was 21 and in FNNAC it was 63. The mean SD in FNAC was 0.55 ± 0.50 and in FNNAC it was 1.66 ± 0.48 respectively. The difference was statistically significant as p value was less than 0.001.

Amount of cellular material was more in FNNAC than in FNAC. Out of 38 cases 10 cases (26.31%) had a score of 2 in FNNAC, while in FNAC no case showed a score of 2. The mean SD in FNAC was 0.82 ± 0.46 and in FNNAC it was 1.24 ± 0.49 respectively. p value was less than 0.001 which was statistically significant.

In amount of cellular degeneration and trauma the total score in FNAC and in FNNAC was 30 and 56. The mean SD was 0.79 ± 0.70 in FNAC and 1.47 ± 0.51 in FNNAC for both cellular trauma and degeneration. In FNNAC all the cases had maximum Score. The difference was statistically significant.

Out of 38 cases 9 cases had a score of 2 in FNNAC and 29 cases showed score of 1 for retention of appropriate architecture. In FNAC 13 cases had a score of zero and 25 cases showed score of 1. The mean SD was 0.66 ± 0.48 in FNAC and 1.21 ± 0.47 in FNNAC. The difference was statistically significant.

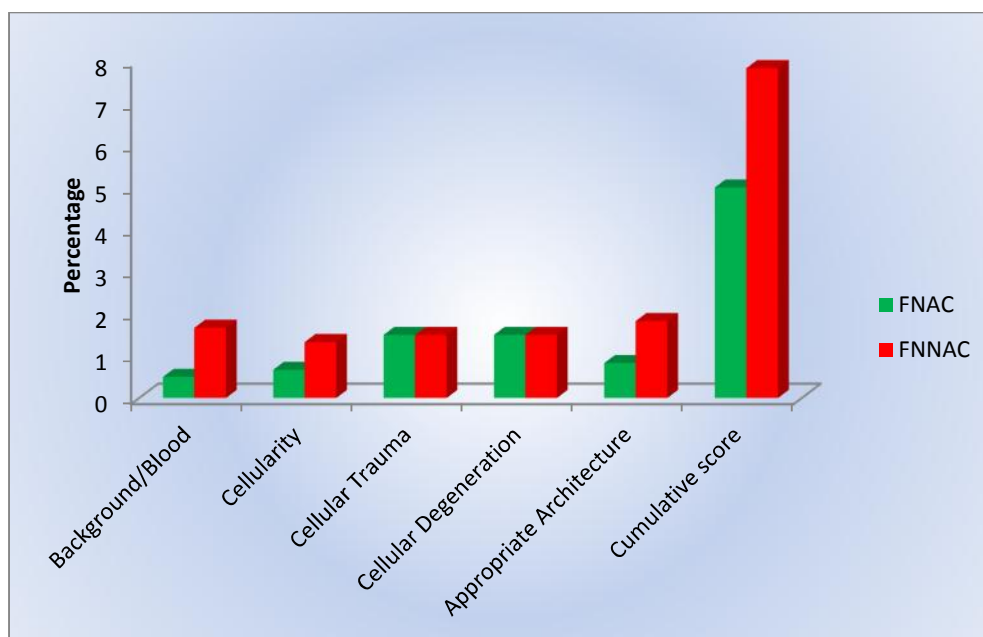
THYROIDITIS-

TABLE 6: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF HASHIMOTO'S/LYMPHOCYTIC THYROIDITIS FOR DIFFERENT PARAMETERS (n = 6)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 3 | 0.50±0.55 | 10 | 1.67±0.52 | 0.001* |
| Cellularity | 4 | 0.67±0.52 | 8 | 1.33±0.52 | 0.025* |
| Cellular Trauma | 9 | 1.50±0.55 | 9 | 1.50±0.55 | NA |
| Cellular Degeneration | 9 | 1.50±0.55 | 9 | 1.50±0.55 | NA |
| Appropriate Architecture | 5 | 0.83±0.41 | 11 | 1.83±0.41 | NA |
| Cumulative score | 30 | 5.00±2.10 | 47 | 7.83±1.94 | <0.001* |

*significant at 5% level of significance

FIG 4: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF HASHIMOTO'S/LYMPHOCYTIC THYROIDITIS FOR DIFFERENT PARAMETERS.



In Background blood the total score was 3 with a mean S.D 0.50 ± 0.55 in FNAC and in FNNAC the total score was 10 with a mean S.D 1.67 ± 0.52 respectively. The difference was statistically significant as p value was 0.001.

In amount of cellular material the total score was 4 with a mean SD 0.67 ± 0.52 in FNAC and in FNNAC the total score was 8 and mean SD 1.33 ± 0.52 respectively with p value of 0.025 which was statistically significant.

In Cellular trauma and cellular degeneration the total and average score by both the techniques scored equal points. The total score was 9 and mean SD was 1.50 ± 0.55 in both the procedures. Therefore there is no significant difference between the two techniques.

Retention of appropriate architecture was better in FNNAC than FNAC. The total and mean SD in FNAC was 5 and 0.83 ± 0.41 and in FNNAC it was 11 and 1.83 ± 0.41 respectively.

The total cumulative scores with SD for all the five parameters in FNAC was 30 and 5.00 ± 2.10 and in FNNAC was 47 and 7.83 ± 1.94 respectively. The difference was statistically significant with p value less than 0.001.

THYROID NEOPLASMS-

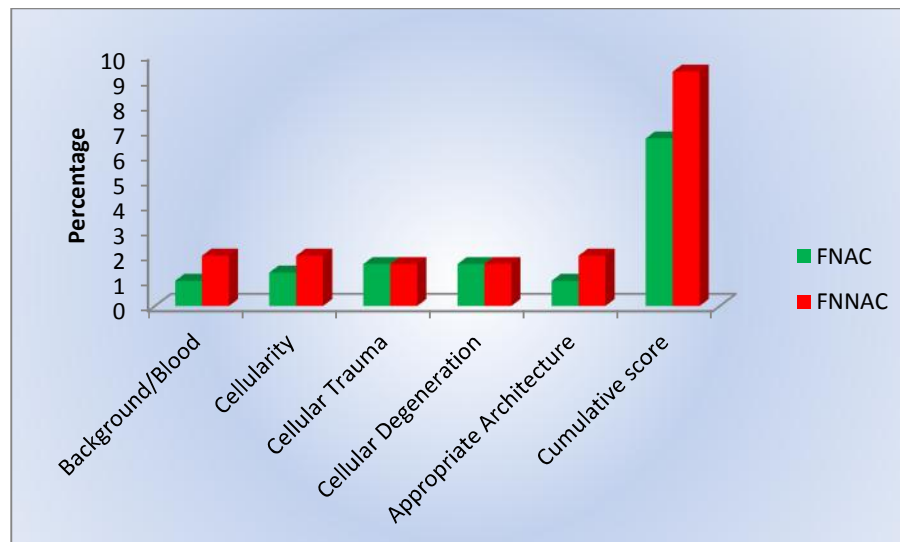
Out of 3 cases of thyroid neoplasms 1 case each of papillary, follicular and medullary carcinoma were compared in a study by both the technique.

TABLE 7: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF PAPILLARY/ MEDULLARY/ FOLLICULAR CARCINOMA FOR DIFFERENT PARAMETERS (n=3)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 3 | 1.00±0.00 | 6 | 2.00±0.00 | NA |
| Cellularity | 4 | 1.33±0.58 | 6 | 2.00±0.00 | 0.184 |
| Cellular Trauma | 5 | 1.67±0.58 | 5 | 1.67±0.58 | NA |
| Cellular Degeneration | 5 | 1.67±0.58 | 5 | 1.67±0.58 | NA |
| Appropriate Architecture | 3 | 1.00±0.00 | 6 | 2.00±0.00 | NA |
| Cumulative score | 20 | 6.67±1.53 | 28 | 9.33±1.15 | 0.015* |

*significant at 5% level of significance

FIG 5: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF PAPILLARY/MEDULLARY/ FOLLICULAR CARCINOMA FOR DIFFERENT PARAMETERS



Background blood was more in FNAC than in FNNAC. The total score was 3 with a mean SD 1.00 ± 0.00 in FNAC and in FNNAC the total score was 6 and SD was 2.00 ± 0.00 . The difference was statistically not significant.

In amount of cellular material the total score and SD was 4 and 1.33 ± 0.58 in FNAC and in FNNAC 6 and 2.0 ± 0.00 respectively. The difference was statistically significant with p value of 0.184.

Amount of cellular trauma and cellular degeneration scored same points for each of this criteria by both the techniques. The total score and mean SD for both the techniques was 5 and 1.67 ± 0.58 . The difference was statistically not significant for both FNAC and FNNAC.

Retention of appropriate architecture was better with FNNAC than FNAC. The total score and mean SD in FNAC was 3 and 1.0 ± 0.00 . The total score in FNNAC was 6 and mean SD was 2.00 ± 0.00 . The difference was statistically not significant.

The total cumulative score and mean SD in thyroid neoplasms was 20 and 6.67 ± 1.53 in FNAC and 28 and 9.33 ± 1.15 in FNNAC respectively and the difference was statistically significant as p value was 0.015.

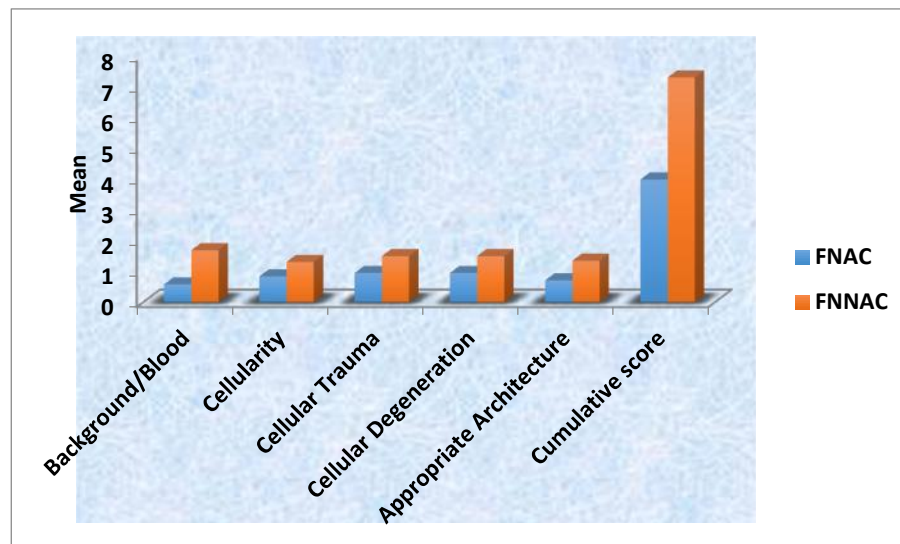
TABLE 8: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF VARIOUS THYROID LESIONS- (n=47)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 27 | 0.57±0.50 | 79 | 1.68±0.47 | <0.001* |
| Cellularity | 39 | 0.83±0.48 | 61 | 1.3±0.51 | <0.001* |
| Cellular Trauma | 44 | 0.94±0.73 | 70 | 1.49±0.51 | <0.001* |
| Cellular Degeneration | 44 | 0.94±0.73 | 70 | 1.49±0.51 | <0.001* |
| Appropriate Architecture | 33 | 0.7±0.46 | 63 | 1.34±0.52 | <0.001* |
| Cumulative score | 187 | 3.98±2.57 | 343 | 7.30±1.82 | <0.001* |

Note *significant at 5% level of significance.

In thyroid lesions non-aspiration technique was superior to aspiration technique for the parameters of background blood, cellularity and appropriate architecture. Total cumulative score and difference was statistically significant with p value of less than 0.001.

FIGURE 6: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF VARIOUS THYROID FOR DIFFERENT PARAMETERS

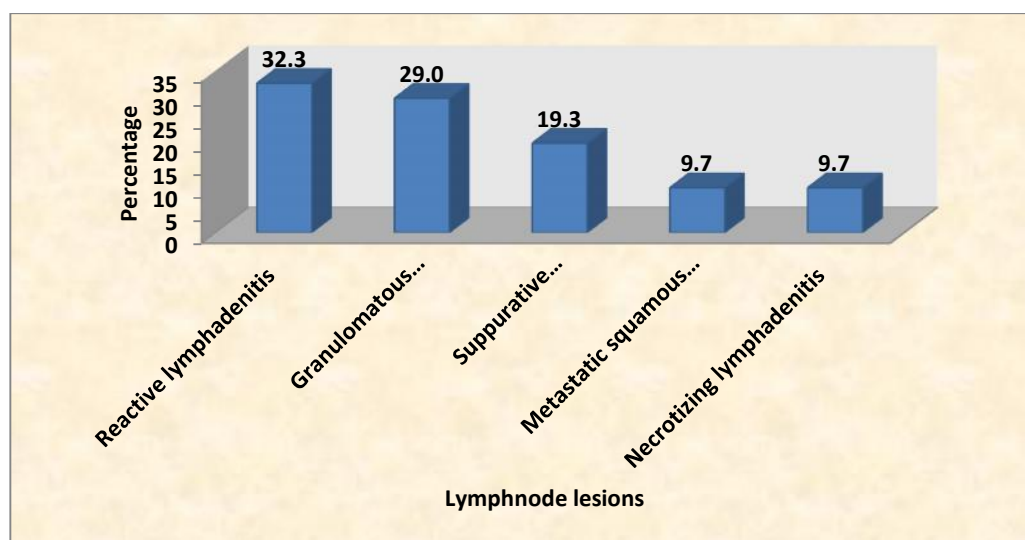


LYMPH-NODES-

TABLE 9: FREQUENCY OF VARIOUS LYMPHNODE LESIONS- (n=31)

| Diagnosis | N | Percent |
|------------------------------------|----|---------|
| Reactive lymphadenitis | 10 | 32.3 |
| Granulomatous lymphadenitis | 9 | 29.0 |
| Suppurative lymphadenitis/abscess | 6 | 19.3 |
| Metastatic squamous cell carcinoma | 3 | 9.7 |
| Necrotizing lymphadenitis | 3 | 9.7 |
| Total | 31 | 100 |

FIGURE 7: BAR DIAGRAM SHOWING FREQUENCY OF LYMPH NODE LESIONS-



Total number of lymph-node lesions were 31. Out of these, 10 cases (32.3%) were of reactive lymphadenitis, 9 cases (20.0%) of granulomatous lymphadenitis, 6 cases (19.3%) of suppurative lymphadenitis and abscess, 3 cases (9.7%) each of necrotizing lymphadenitis and metastatic squamous cell carcinoma.

REACTIVE LYMPHADENITIS-

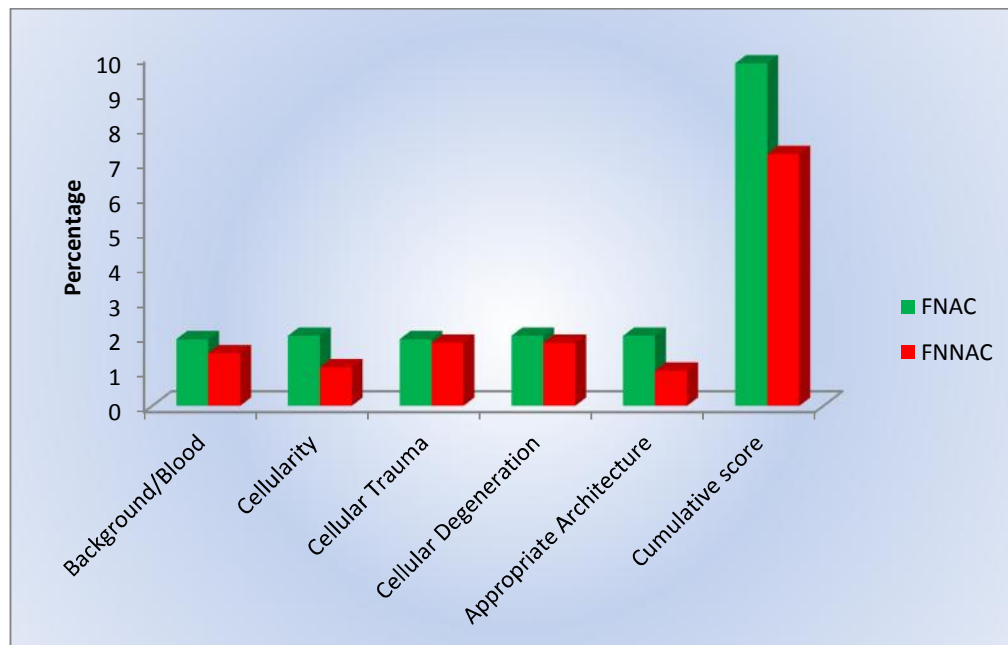
TABLE 10: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF REACTIVE LYMPHADENITIS FOR DIFFERENT PARAMETERS

(n= 10)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 19 | 1.90±0.32 | 15 | 1.50±0.53 | 0.037* |
| Cellularity | 20 | 2.00±0.00 | 11 | 1.10±0.32 | <0.001* |
| Cellular Trauma | 19 | 1.90±0.32 | 18 | 1.80±0.42 | 0.343 |
| Cellular Degeneration | 20 | 2.00±0.00 | 18 | 1.80±0.42 | 0.168 |
| Appropriate Architecture | 20 | 2.00±0.00 | 10 | 1.00±0.00 | NA |
| Cumulative score | 98 | 9.80±0.42 | 72 | 7.20±1.03 | <0.001* |

*significant at 5% level of significance

FIG 8: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED OF FNAC AND FNNAC OF REACTIVE LYMPHADENITIS FOR DIFFERENT PARAMETERS-



Background blood was better with FNAC than FNNAC. Out of 10 cases score of 2 was noted in 9 cases of FNAC and 5 cases of FNNAC. The total score and mean SD was 19 and 1.90 ± 0.32 in FNAC and in FNNAC it was 15 and 1.50 ± 0.53 respectively. The difference was statistically significant and p value was 0.037.

In amount of cellular material all the 10 cases showed a score of 2 in FNAC and only one case showed score of 2 in FNNAC. The total score and mean SD in FNAC was 20 and 2.00 ± 0.00 . The total score and mean SD in FNNAC was 11 and 1.10 ± 0.32 . The difference was statistically significant at 5 % interval with a p value of less than 0.001.

Cellular trauma and degeneration was almost same in FNNAC and FNAC. The total score in FNAC by cellular trauma was 19 and mean SD 1.90 ± 0.32 and in FNNAC the total score was 18 and mean SD was 1.80 ± 0.42 . The total score in FNAC by cellular degeneration was 20 and mean SD was 2.0 ± 0.00 and in FNNAC it was 18 and 1.80 ± 0.42 . The difference was statistically significant.

The good retention of architecture was seen with Fine needle aspiration technique. The total score was 20 and mean SD was 2.00 ± 0.00 in FNAC and in FNNAC the total score was 10 and mean S.D was 1.00 ± 0.00 . The difference was not statistically significant.

The total cumulative score was 98 and mean SD was 9.80 ± 0.42 in FNAC and in FNNAC the total cumulative score was 72 and mean SD was 7.20 ± 1.03 . The difference was statistically significant with p value of less than 0.001.

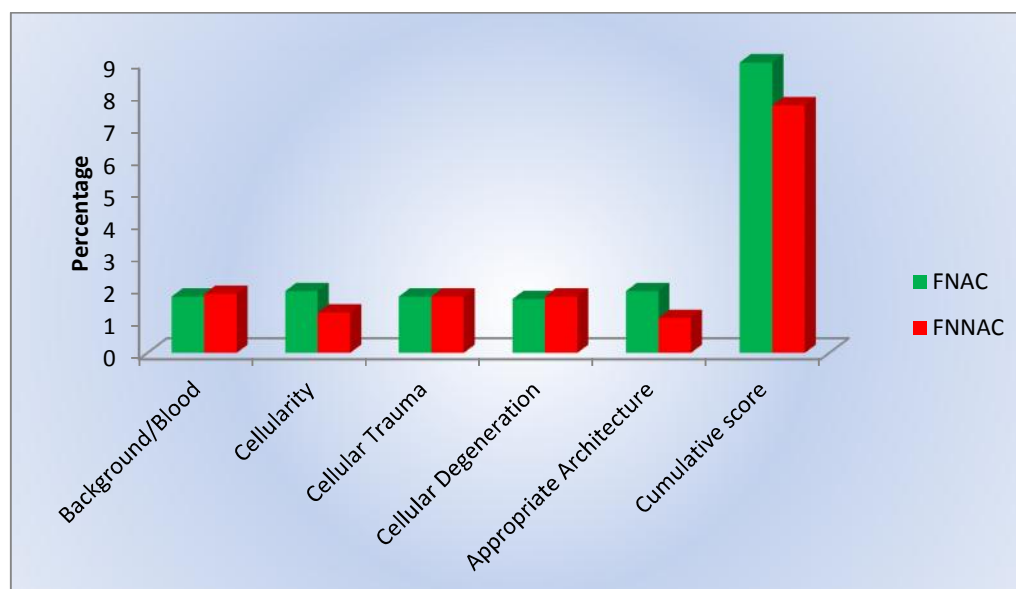
GRANULOMATOUS/ NECROTIZING LYMPHADENITIS

TABLE 11: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF GRANULOMATOUS/ NECROTIZING/ TUBERCULOUS LYMPHADENITIS/ CHRONIC GRANULOMATOUS INFLAMMATION FOR DIFFERENT PARAMETERS (n=12)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 21 | 1.75±0.45 | 22 | 1.83±0.39 | 0.674 |
| Cellularity | 23 | 1.92±0.29 | 15 | 1.25±0.45 | 0.005* |
| Cellular Trauma | 21 | 1.75±0.45 | 21 | 1.75±0.45 | No difference |
| Cellular Degeneration | 20 | 1.67±0.49 | 21 | 1.75±0.45 | 0.674 |
| Appropriate Architecture | 23 | 1.92±0.29 | 13 | 1.08±0.29 | <0.001* |
| Cumulative score | 108 | 9.00±1.41 | 92 | 7.67±1.30 | 0.063 |

*significant at 5% level of significance

FIG 9: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF GRANULOMATOUS/NECROTIZING LYMPHADENITIS FOR DIFFERENT PARAMETERS-



The background blood score was better in FNNAC than FNAC. The total score in FNAC was 21 with mean SD of 1.75 ± 0.45 And in FNNAC the total score was 22 and mean SD was 1.83 ± 0.39 . The difference was statistically significant with a p value of 0.674.

Cellularity was better in FNAC than in FNNAC. The total score in FNAC was 23 and mean SD was 1.92 ± 0.29 and in FNNAC the total score was 15 and mean SD was 1.25 ± 0.45 . The difference was statistically significant.

The cellular trauma and degeneration was almost equal in both the techniques. The total score for cellular trauma was 21 with a mean SD of 1.75 ± 0.45 in both the techniques.

The total score was 20 with a mean SD of 1.67 ± 0.29 for cellular degeneration in FNAC and in FNNAC the total score was 21 with a mean SD of 1.75 ± 0.45 .

The Retention of appropriate architecture was better in FNAC than in FNNAC. The total score in FNAC was 23 and mean SD was 1.92 ± 0.29 and in FNNAC it scored less that was 13 and mean SD was 1.08 ± 0.29 . The difference was statistically significant with p value less than 0.001. The total cumulative score was 108 and mean SD was 9.00 ± 1.41 which was also greater in FNAC when compared with FNNAC. The difference was statistically significant.

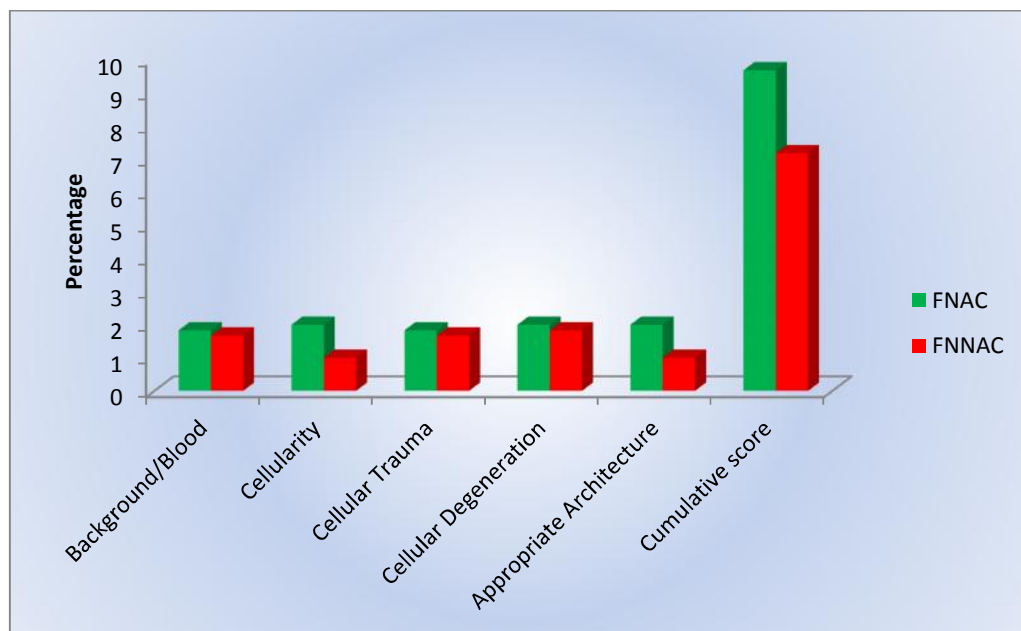
ACUTE SUPPURATIVE LYMPHADENITIS/ABSCESS-

TABLE 12: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF ACUTE SUPPURATIVE LYMPHADENITIS/ABSCESS FOR DIFFERENT PARAMETERS (n=12)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 11 | 1.83±0.41 | 10 | 1.67±0.52 | 0.363 |
| Cellularity | 12 | 2.00±0.00 | 6 | 1.00±0.00 | NA |
| Cellular Trauma | 11 | 1.83±0.41 | 10 | 1.67±0.52 | 0.363 |
| Cellular Degeneration | 12 | 2.00±0.00 | 11 | 1.83±0.41 | 0.363 |
| Appropriate Architecture | 12 | 2.00±0.00 | 6 | 1.00±0.00 | NA |
| Cumulative score | 58 | 9.67±0.52 | 43 | 7.17±0.75 | <0.001* |

*significant at 5% level of significance

TABLE 10: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF ACUTE SUPPURATIVE LYMPHADENITIS/ABSCESS FOR DIFFERENT PARAMETERS-



In background blood the total score was 11 and mean SD was 1.83 ± 0.41 in FNAC and in FNNAC the total score was 10 and mean SD was 1.67 ± 0.52 . The difference was not statistically significant.

The amount of cellular material was more with FNAC than FNNAC. The total score was 12 and 2.00 ± 0.00 in FNAC which was higher compared to FNNAC.

Cellular trauma and degeneration were almost equal in both the techniques. The total score by cellular trauma was 11 and mean SD was 1.83 ± 0.41 in FNAC and in FNNAC the total score was 10 and mean SD was 1.67 ± 0.52 with a p value of 0.363 which was statistically not significant. The total score by cellular degeneration was 12 and mean SD was 2.00 ± 0.00 in FNAC and FNNAC showed total score of 11 and mean SD was 1.83 ± 0.41 with a p value of 0.363.

Better architecture was seen in more number of aspiration smears. The total score was 12 with a mean SD was 2.00 ± 0.00 which was more in FNAC. The total score was 6 and mean SD was 1.00 ± 0.00 in FNNAC. The total cumulative score was more in FNAC when compared with FNNAC.

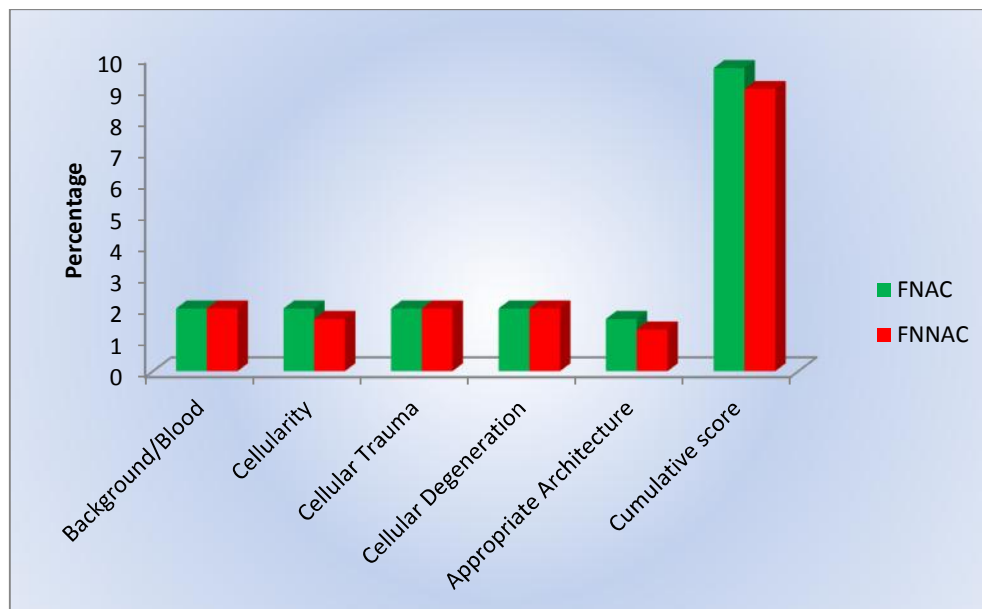
METASTATIC SQUAMOUS CELL CARCINOMA

TABLE 13: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF METASTATIC SQUAMOUS CELL CARCINOMA FOR DIFFERENT PARAMETERS (n=3)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 6 | 2.00±0.00 | 6 | 2.00±0.00 | NA |
| Cellularity | 6 | 2.00±0.00 | 5 | 1.67±0.58 | 0.423 |
| Cellular Trauma | 6 | 2.00±0.00 | 6 | 2.00±0.00 | NA |
| Cellular Degeneration | 6 | 2.00±0.00 | 6 | 2.00±0.00 | NA |
| Appropriate Architecture | 5 | 1.67±0.58 | 4 | 1.33±0.58 | 0.667 |
| Cumulative score | 29 | 9.67±0.58 | 27 | 9.00±1.00 | 0.529 |

*significant at 5% level of significance

FIG 11: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF METASTATIC SQUAMOUS CELL CARCINOMA FOR DIFFERENT PARAMETERS



Background Blood was almost equal in both the techniques. The total score was 6 and mean SD was 2.00 ± 0.00 in both FNAC and FNNAC.

The cellularity was comparatively better in FNAC than FNNAC. The total score in FNAC was 6 and mean SD was 2.00 ± 0.00 and in FNNAC the total score was 5 and mean SD was 1.67 ± 0.58 .

Score for cellular trauma and degeneration was same by both the techniques having a total score of 6 and SD of 2.00 ± 0.00 respectively.

FNAC smears showed better retention of architecture. The total score in FNAC was 5 and mean SD was 1.67 ± 0.58 and in FNNAC the total score was 4 and mean SD was 1.33 ± 0.58 .

The total cumulative score in squamous cell carcinoma was 29 and mean SD was 9.67 ± 0.58 in FNAC and total cumulative score in FNNAC was 27 and mean SD was 9.00 ± 1.00 . The difference was not statistically significant.

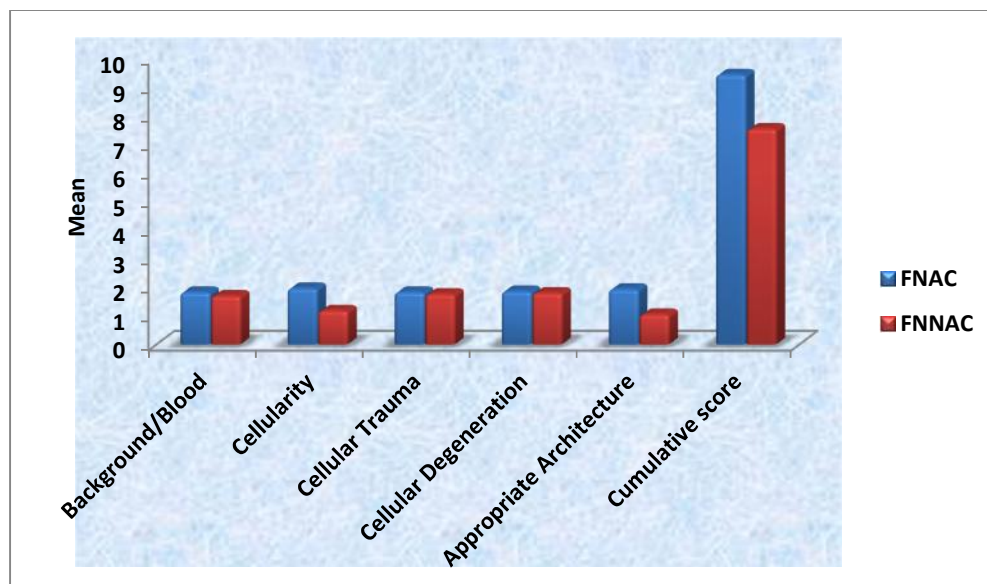
TABLE 14: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF LESIONS IN LYMPH NODE FOR DIFFERENT PARAMETERS-

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 57 | 1.84±0.37 | 53 | 1.71±0.46 | 0.211 |
| Cellularity | 61 | 1.97±0.18 | 37 | 1.19±0.40 | <0.001* |
| Cellular Trauma | 57 | 1.84±0.37 | 55 | 1.77±0.43 | 0.325 |
| Cellular Degeneration | 58 | 1.87±0.34 | 56 | 1.81±0.40 | 0.489 |
| Appropriate Architecture | 60 | 1.94±0.25 | 33 | 1.06±0.25 | <0.001* |
| Cumulative score | 293 | 9.45±0.99 | 234 | 7.55±1.18 | <0.001* |

Note *significant at 5% level of significance

In lymph-node lesions aspiration technique was superior to non-aspiration technique for the parameters of background blood, cellularity, appropriate architecture and in total cumulative score and difference was statistically significant with a p value less than 0.001.

FIGURE 12: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF LESIONS IN LYMPHNODE FOR DIFFERENT PARAMETERS



SALIVARY GLAND

**TABLE 15: FREQUENCY OF VARIOUS SALIVARY GLAND LESIONS-
(n=31)**

| Diagnosis | N | Percent |
|-------------------------------------------------------------|---|---------|
| Pleomorphic adenoma | 2 | 33.3 |
| Metastatic poorly differentiated Squamous cell carcinoma | 1 | 16.7 |
| Myoepithelioma | 1 | 16.7 |
| Squamous cell carcinoma | 1 | 16.7 |
| Sialadenosis | 1 | 16.7 |
| Total | 6 | 100 |

**FIGURE 13: BAR DIAGRAM SHOWING FREQUENCY OF VARIOUS
SALIVARY GLAND LESIONS-**

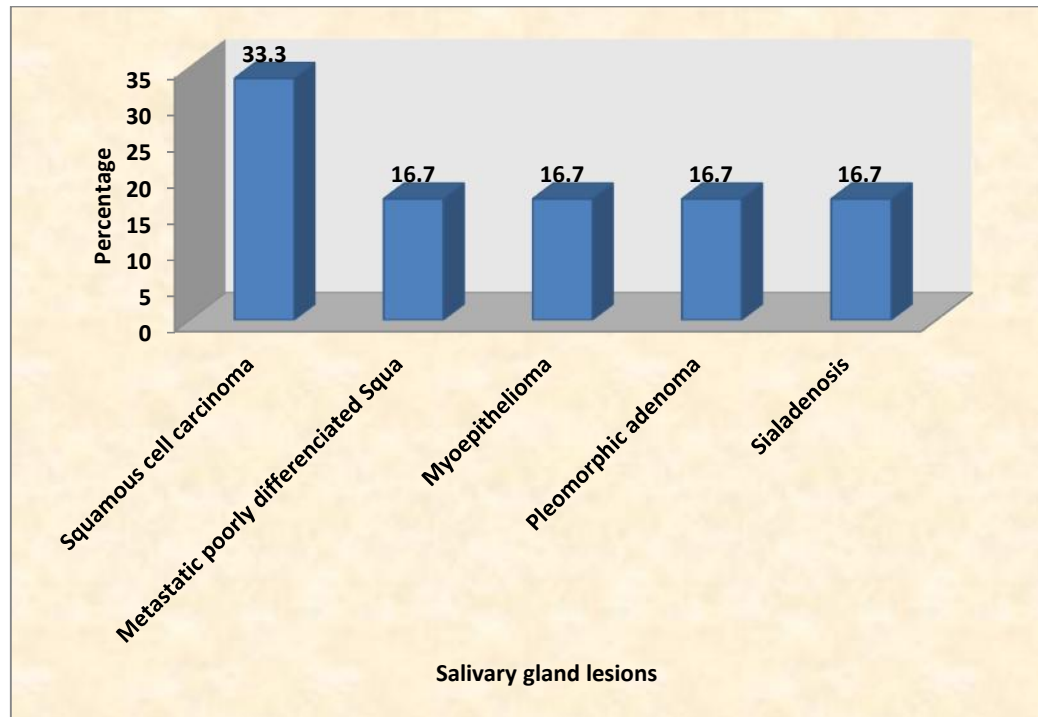
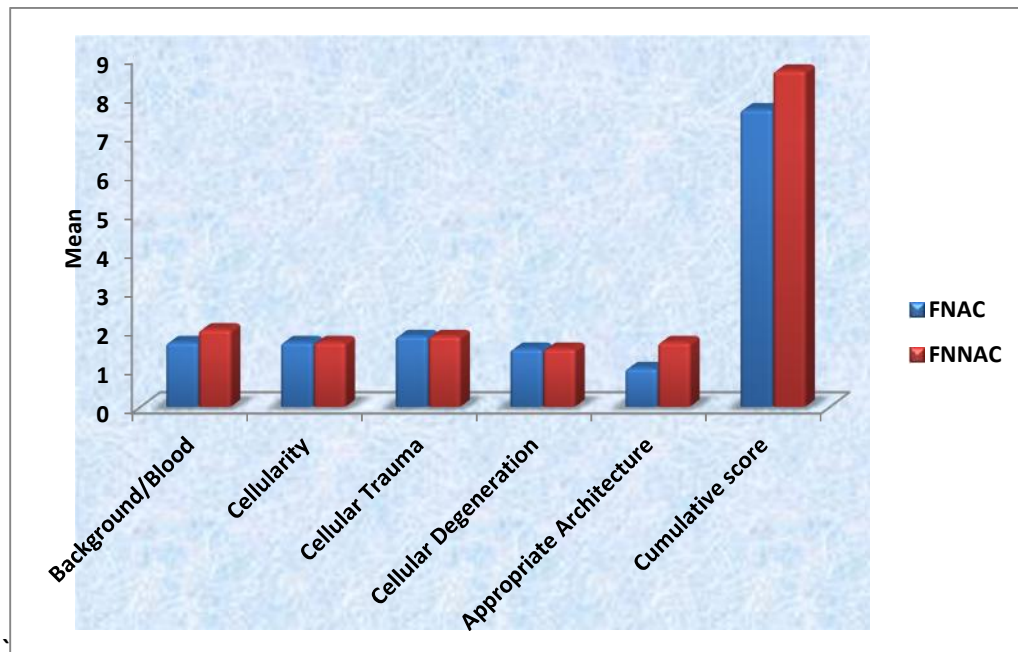


TABLE 16: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF SALIVARY GLAND LESIONS FOR DIFFERENT PARAMETERS (n=6)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 10 | 1.67±0.52 | 12 | 2.00±0.00 | 0.175 |
| Cellularity | 10 | 1.67±0.52 | 10 | 1.67±0.52 | No difference |
| Cellular Trauma | 11 | 1.83±0.41 | 11 | 1.83±0.41 | No difference |
| Cellular Degeneration | 9 | 1.50±0.55 | 9 | 1.50±0.55 | No difference |
| Appropriate Architecture | 6 | 1.00±0.00 | 10 | 1.67±0.52 | 0.025 |
| Cumulative score | 46 | 7.67±1.21 | 52 | 8.67±1.51 | 0.041* |

Note *significant at 5% level of significance

FIGURE 14: BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF SALIVARY GLAND FOR DIFFERENT PARAMETERS



Background blood score was better in FNNAC than FNAC technique. The total scores in FNAC was 10 and mean SD was 1.67 ± 0.52 and in FNNAC the total score was 12 and mean SD was 2.00 ± 0.00 .

Scores for amount of cellular material, cellular trauma and cellular degeneration in both FNAC and FNNAC techniques was similar. The total score for cellularity was 10 and mean SD was 1.67 ± 0.52 . For cellular degeneration the total scores was 9 with mean SD of 1.50 ± 0.55 and for cellular trauma, it was 11 and 1.83 ± 0.41 respectively.

The retention of appropriate architecture was better with FNNAC than FNAC. The total score in FNAC was 6 and mean SD was 1.00 ± 0.00 and in FNNAC the total score was 10 and mean SD was 1.67 ± 0.52 . The difference was statistically significant $p = 0.025$.

The total cumulative score in FNAC was 46 and in FNNAC 52 which showed that in salivary lesions FNNAC was better than FNAC with statistically minimal difference between the two techniques.

MISCELLANEOUS-

There were 6 miscellaneous lesions in the present study. These were 2 cases (33.3%) of epidermoid cyst/thyroglossal cyst, 1 case (16.7) each of Abscess, benign cystic lesion, schwannoma and tuberculous abscess.

TABLE 17: FREQUENCY OF VARIOUS MISCELLANEOUS LESIONS-

| Diagnosis | N | Percent |
|------------------------------------|----------|----------------|
| Epidermoid cyst/ thyroglossal cyst | 2 | 33.3 |
| Abscess | 1 | 16.7 |
| Benign Cystic lesion | 1 | 16.7 |
| Schwannoma | 1 | 16.7 |
| Tuberculous abscess | 1 | 16.7 |
| Total | 6 | 100 |

FIGURE 15: BAR DIAGRAM SHOWING FREQUENCY OF VARIOUS MISCELLANEOUS LESIONS-

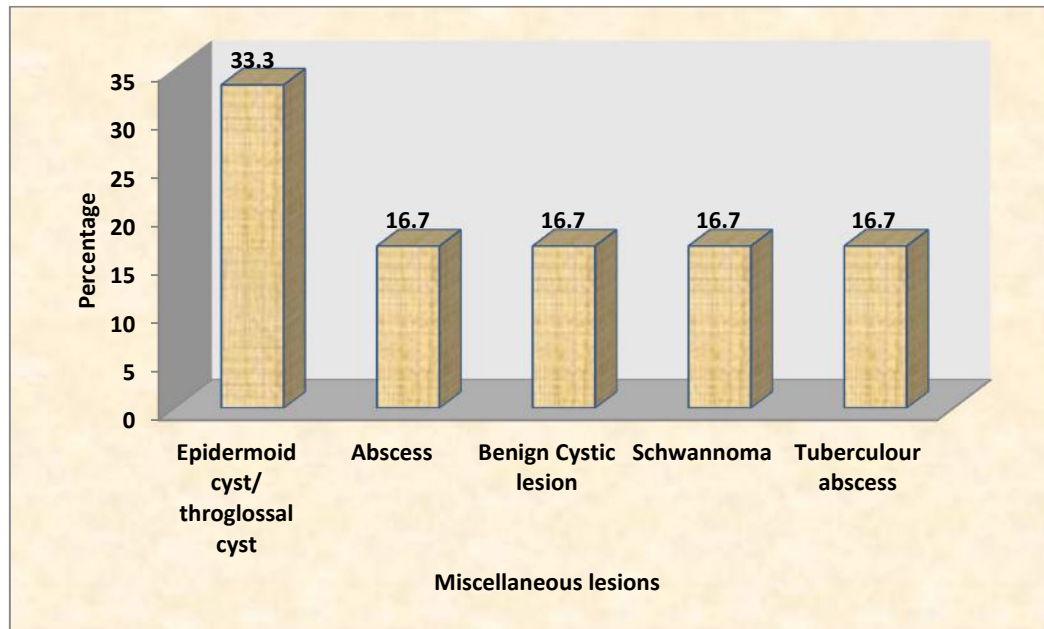
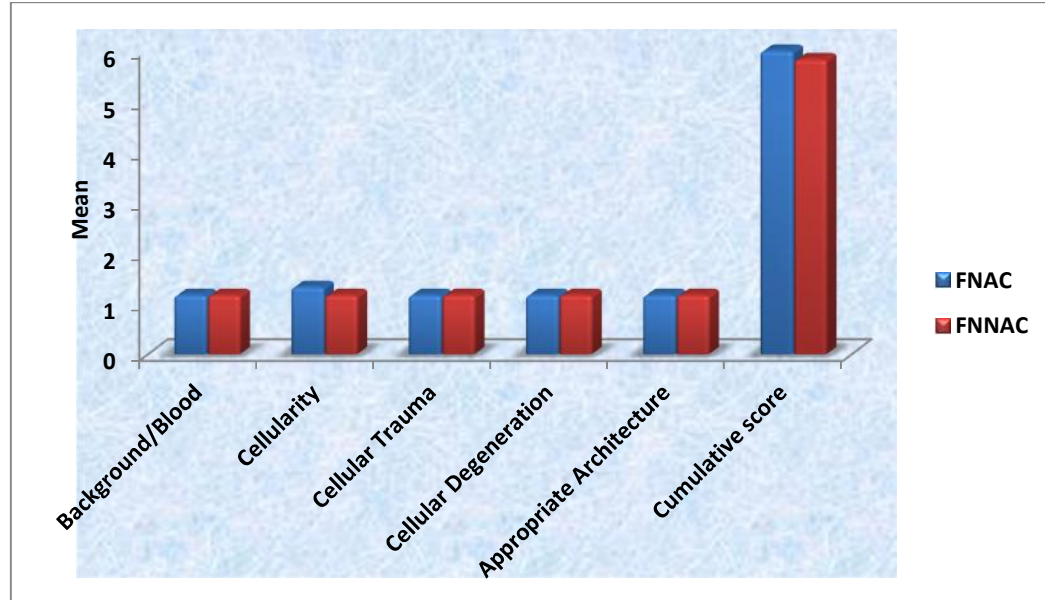


TABLE 18: COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF MISCELLANEOUS LESIONS FOR DIFFERENT PARAMETERS (n=6)

| Criteria | FNAC | | FNNAC | | p value |
|--------------------------|------|-----------|-------|-----------|---------------|
| | Sum | Mean±SD | Sum | Mean±SD | |
| Background Blood | 7 | 1.17±0.41 | 7 | 1.17±0.41 | No difference |
| Cellularity | 8 | 1.33±0.52 | 7 | 1.17±0.41 | 0.363 |
| Cellular Trauma | 7 | 1.17±0.41 | 7 | 1.17±0.41 | No difference |
| Cellular Degeneration | 7 | 1.17±0.41 | 7 | 1.17±0.41 | No difference |
| Appropriate Architecture | 7 | 1.17±0.41 | 7 | 1.17±0.41 | No difference |
| Cumulative score | 36 | 6.00±2.00 | 35 | 5.83±2.04 | 0.363 |

Note *significant at 5% level of significance

FIGURE 16- BAR DIAGRAM SHOWING COMPARISON OF SCORES OBTAINED BY FNAC AND FNNAC OF MISCELLANEOUS FOR DIFFERENT PARAMETERS-



Background blood, cellular trauma, cellular degeneration and appropriate architecture showed same scores in both the techniques. The total scores and mean SD in both the techniques was 7 and 1.17±0.41. Amount of cellular material was better in FNAC than FNNAC. The total score and mean SD were 8 and 1.33 in FNAC and 7 and 1.17 in FNNAC respectively.

The total cumulative score was 36 in FNAC and 35 in FNNAC with a p value of 0.363 which was not statistically significant but showed that FNAC is better than FNNAC with a minimal difference between the two techniques.

TABLE 19: PERFORMANCE OF FNAC IN HEAD AND NECK LESIONS-

| Site | Insufficient for Diagnosis (0-2) | | Diagnostically adequate (3-6) | | Diagnostically superior (7-10) | | Chi sq. p value |
|----------------------|----------------------------------|-------|-------------------------------|-------|--------------------------------|-------|-----------------|
| | N | % | N | % | N | % | |
| Lymph node (n=31) | 0 | 0.0% | 1 | 3.2% | 30 | 96.8% | <0.001* |
| Salivary gland (n=6) | 0 | 0.0% | 1 | 16.7% | 5 | 83.3% | |
| Thyroid (n=47) | 16 | 34.0% | 21 | 44.7% | 10 | 21.3% | |
| Miscellaneous (n=6) | 0 | 0.0% | 5 | 83.3% | 1 | 16.7% | |
| Total (n=90) | 16 | 17.8% | 28 | 31.1% | 46 | 51.1% | |

In thyroid lesions in fine needle aspiration cytology out of 47 cases 10 cases (21.3%) were diagnostically superior, 21 cases (44.7%) were diagnostically adequate and 16 (34%) cases were insufficient for diagnosis.

In lymph-node lesions in fine needle aspiration cytology out of 31 cases 30 cases (96.8%) were diagnostically superior and 1 case (3.2%) was diagnostically adequate and no cases was insufficient for diagnosis.

In salivary gland lesions fine needle aspiration cytology out of 6 cases 5 cases (83.3%) were diagnostically superior, 1 case (16.7%) was diagnostically adequate and no cases was insufficient for diagnosis.

In miscellaneous fine needle aspiration cytology out of 6 cases 1 case (16.7%) was diagnostically superior, 5 cases (83.3%) were diagnostically adequate.

FNAC in thyroid lesions showed more diagnostically adequate cases but less diagnostically superior cases and in lymph- node lesions more diagnostically superior cases and less diagnostically adequate cases. In salivary gland and miscellaneous group more diagnostically superior and less diagnostically adequate cases were noted.

TABLE 20: PERFORMANCE OF FNNAC IN HEAD AND NECK LESIONS-

| Site | Insufficient for Diagnosis (0-2) | | Diagnostically adequate (3-6) | | Diagnostically superior (7-10) | | Chi sq. p value |
|---------------------|----------------------------------|------|-------------------------------|-------|--------------------------------|--------|-----------------|
| | N | % | N | % | N | % | |
| Lymphnode (n=31) | 0 | 0.0% | 6 | 19.4% | 25 | 80.6% | 0.033* |
| Salivary gland(n=6) | 0 | 0.0% | 0 | 0.0% | 6 | 100.0% | |
| Thyroid(n=47) | 1 | 2.1% | 15 | 31.9% | 31 | 66.0% | |
| Miscellaneous(n=6) | 0 | 0.0% | 5 | 83.3% | 1 | 16.7% | |
| Total(n=90) | 1 | 1.1% | 26 | 28.9% | 63 | 70.0% | |

In thyroid lesions in FNNAC out of 47 cases 31 cases (66.0%) were diagnostically superior, 15 cases (31.9%) were diagnostically adequate and 1 case (2.1%) was insufficient for diagnosis.

In lymph-node lesions in FNNAC out of 31 cases 25 cases (80.6%) were diagnostically superior, 6 cases (19.4%) were diagnostically adequate and no cases was insufficient for diagnosis.

In salivary gland in FNNAC all 6 cases (100%) were diagnostically superior.

In miscellaneous group in FNNAC out of 6 cases 1 case (16.7%) was diagnostically superior and 5 cases (83.3%) were diagnostically adequate.

FNNAC in thyroid lesions showed more diagnostically superior cases and less diagnostically adequate cases, however in lymph- node lesions more diagnostically superior cases and less diagnostically adequate cases were noted. In salivary gland in FNNAC more diagnostically superior cases and less diagnostically adequate cases were noted, however in miscellaneous groups more diagnostically adequate cases and less diagnostically superior cases were noted.

PHOTOMICROGRAPHS

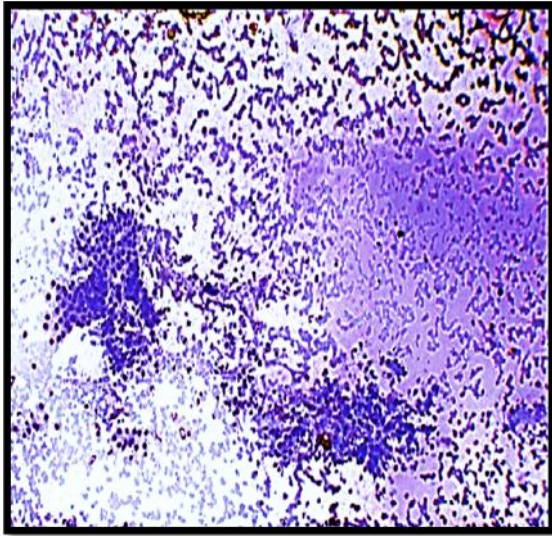


FIG 17- PHOTOMICROGRAPH SHOWING MULTINODULAR GOITRE BY FNAC TECHNIQUE (GIEMSA STAIN, 100X)

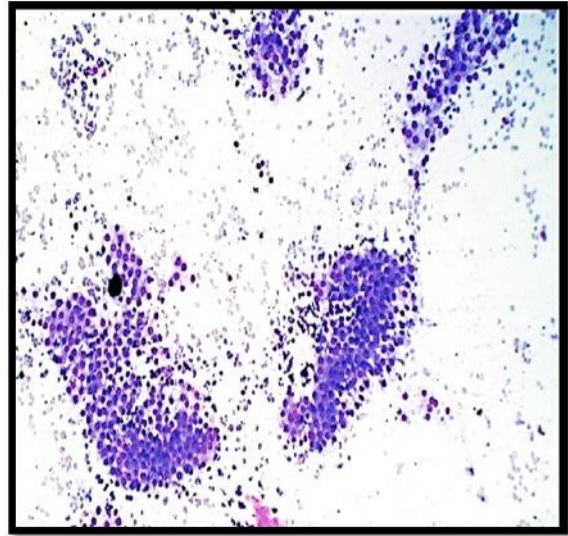


FIG 18- PHOTOMICROGRAPH SHOWING MULTINODULAR GOITRE BY FNNAC TECHNIQUE (GIEMSA STAIN, 100X)

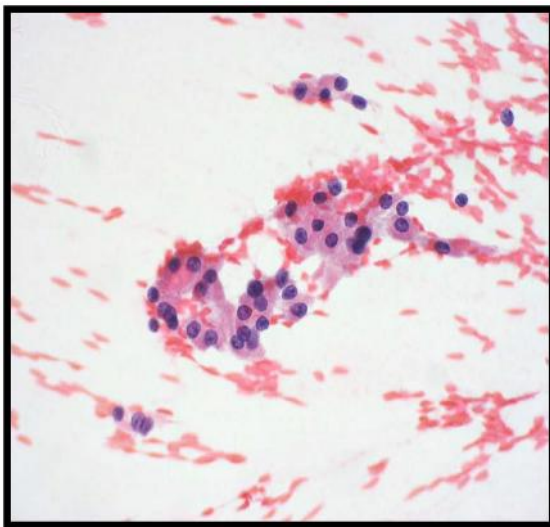


FIG 19- PHOTOMICROGRAPH SHOWING HASHIMOTOS THYROIDITIS BY FNAC TECHNIQUE, GIEMSA STAIN, 100X

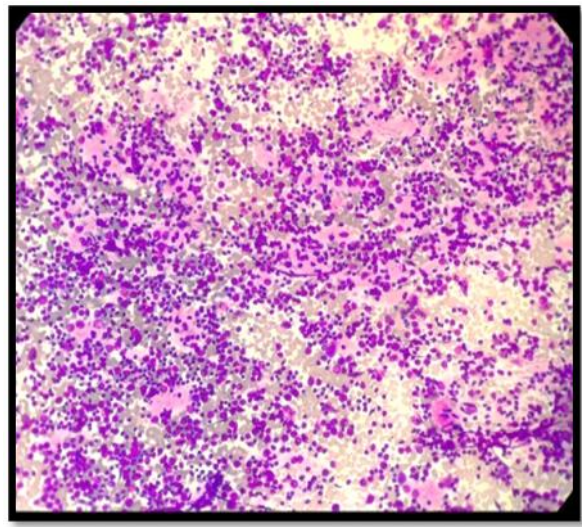


FIG 20- PHOTOMICROGRAPH SHOWING HASHIMOTOS THYROIDITIS BY FNNAC TECHNIQUE, GIEMSA STAIN, 100X

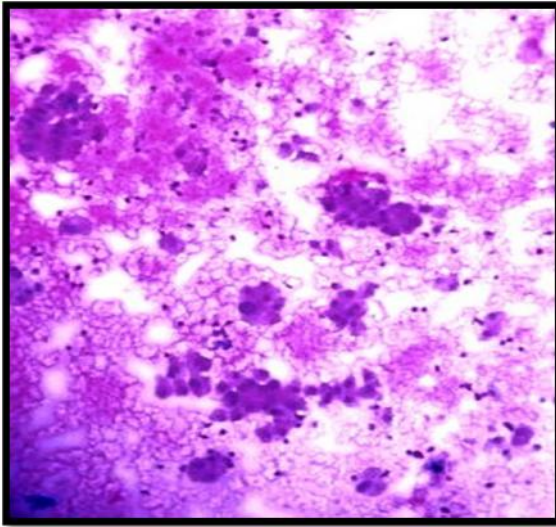


FIG 21- PHOTOMICROGRAPH SHOWING FOLLICULAR NEOPLASM BY FNAC TECHNIQUE (GIEMSA STAIN, 200X)

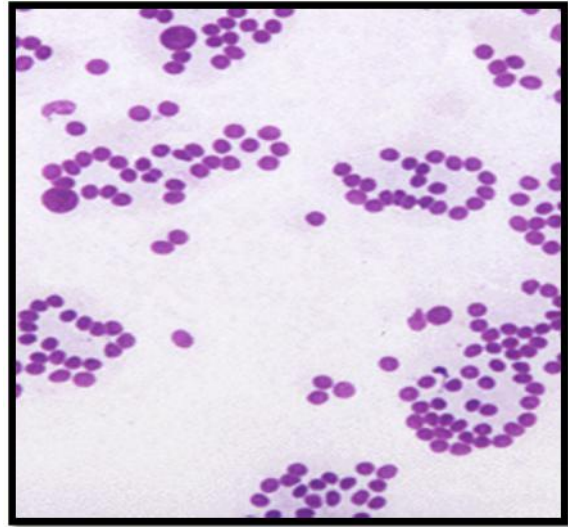


FIG 22- PHOTOMICROGRAPH SHOWING FOLLICULAR NEOPLASM BY FNNAC TECHNIQUE (GIEMSA STAIN, 200X)

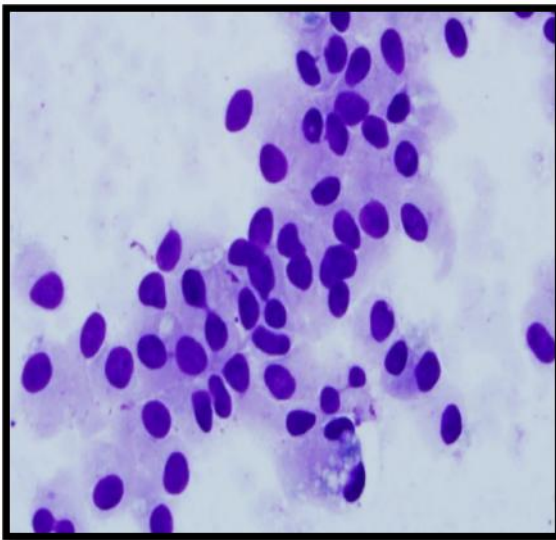


FIG 23- PHOTOMICROGRAPH SHOWING PAPILLARY CARCINOMA BY FNAC TECHNIQUE (GIEMSA STAIN, 400X)

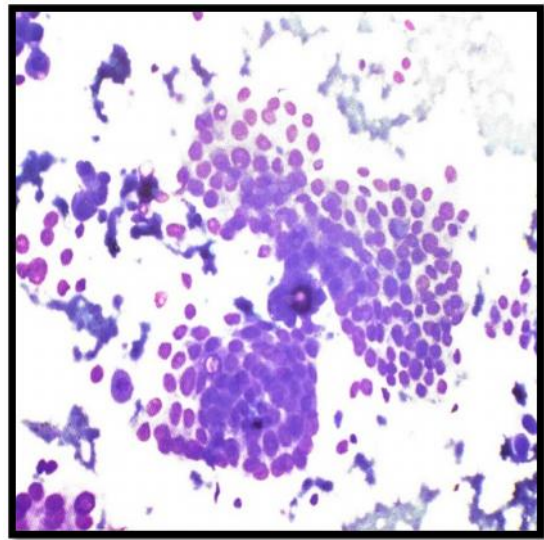


FIG 24- PHOTOMICROGRAPH SHOWING PAPILLARY NEOPLASM BY FNNAC TECHNIQUE (GIEMSA STAIN, 400X)

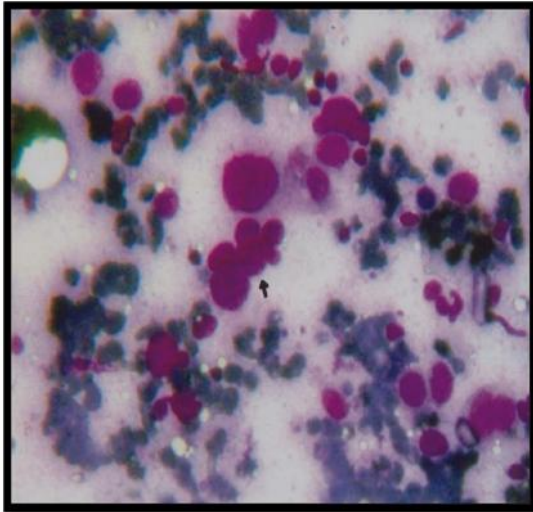


FIG 25- PHOTOMICROGRAPH SHOWING
MEDULLARY NEOPLASM BY FNAC
TECHNIQUE (GIEMSA STAIN, 400X)

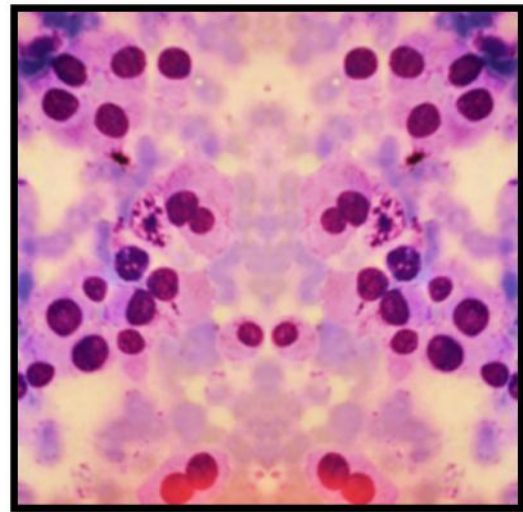


FIG 26- PHOTOMICROGRAPH SHOWING
MEDULLARY NEOPLASM BY FNNAC
TECHNIQUE (GIEMSA STAIN, 400X)

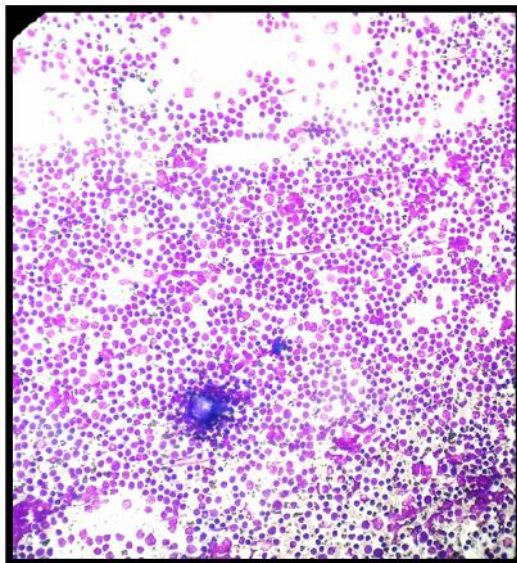


FIG 27- PHOTOMICROGRAPH
SHOWING REACTIVE
LYMPHADENITIS BY FNAC
TECHNIQUE (GIEMSA STAIN, 100X)

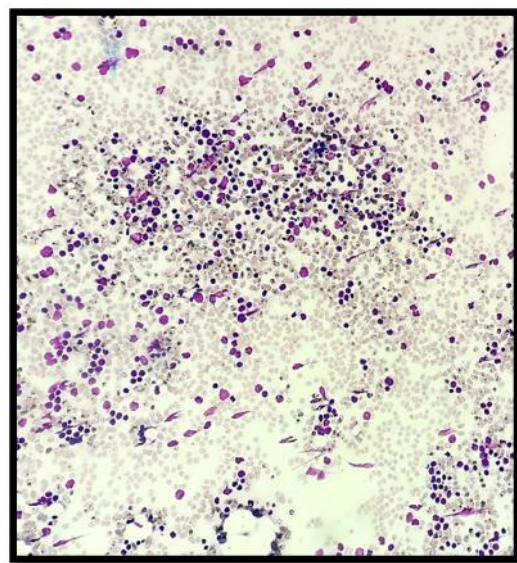


FIG 28- PHOTOMICROGRAPH SHOWING
REACTIVE LYMPHADENITIS BY FNNAC
TECHNIQUE (GIEMSA STAIN, 100X)

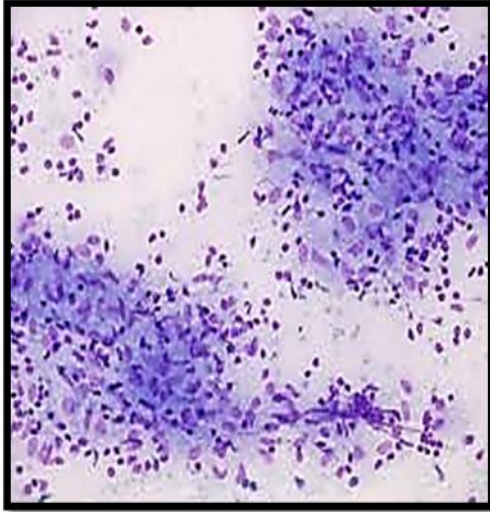


FIG 29- PHOTOMICROGRAPH SHOWING GRANULOMATOUS LYMPHADENITIS BY FNAC TECHNIQUE (GIEMSA STAIN, 200X)

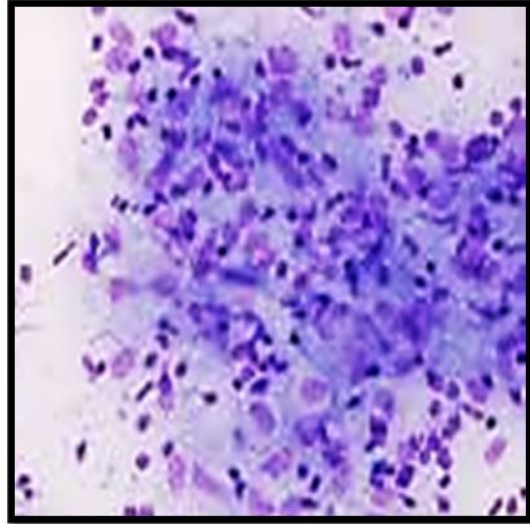


FIG 30- PHOTOMICROGRAPH SHOWING GRANULOMATOUS LYMPHADENITIS BY FNNAC TECHNIQUE (GIEMSA STAIN, 200X)

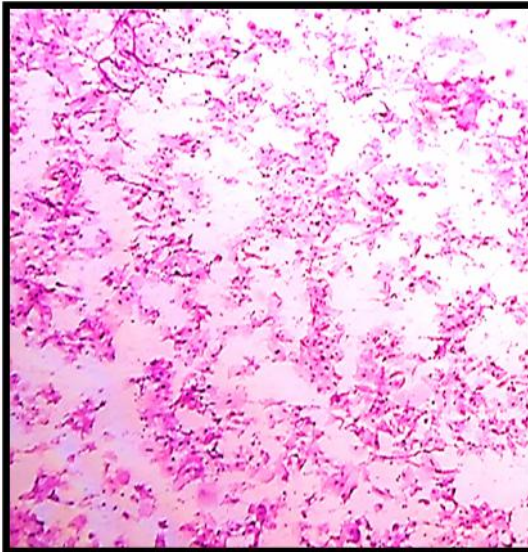


FIG 31- PHOTOMICROGRAPH SHOWING METASTATIC SQUAMOUS CELL CARCINOMA BY FNAC TECHNIQUE (H & E STAIN 100X)

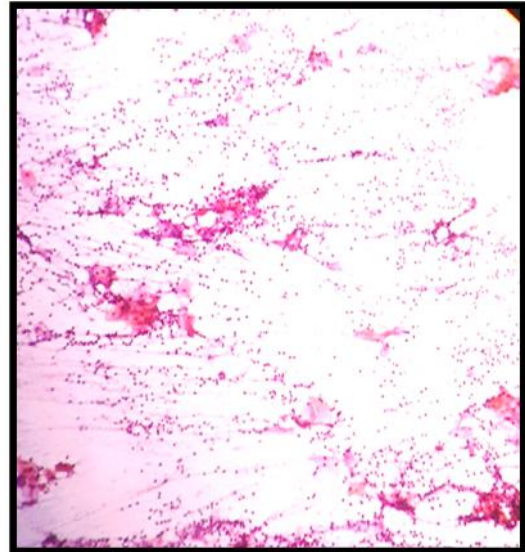


FIG 32- PHOTOMICROGRAPH SHOWING METASTATIC SQUAMOUS CELL CARCINOMA BY FNNAC TECHNIQUE (PAP STAIN 100X)

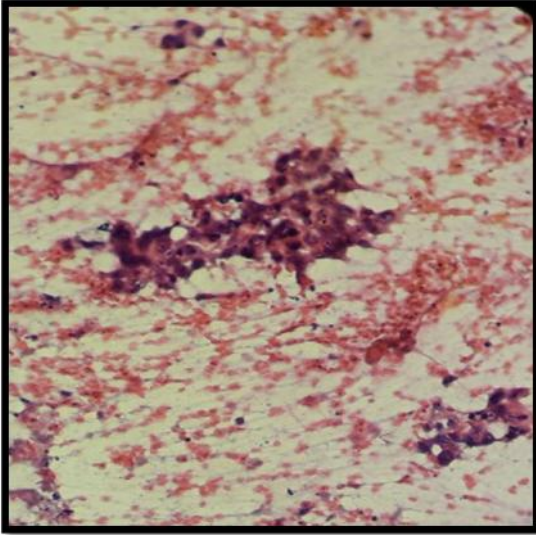


Fig 33- PHOTOMICROGRAPH SHOWING SQUAMOUS CELL CARCINOMA BY FNAC TECHNIQUE (PAP STAIN 200X)

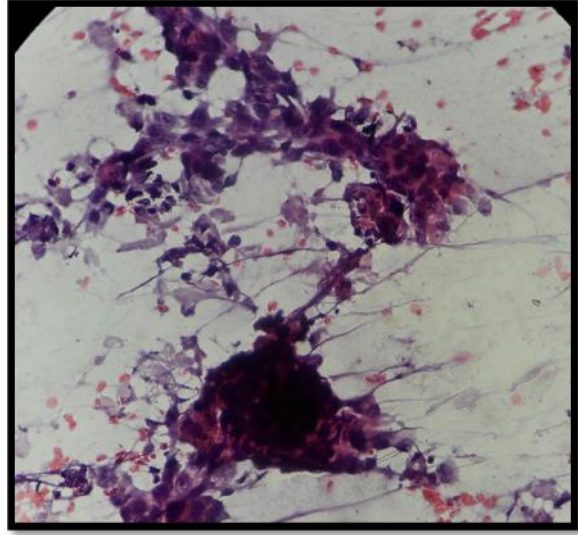


Fig 34-PHOTOMICROGRAPH SHOWING SQUAMOUS CELL CARCINOMA BY FNNAC TECHNIQUE (PAP STAIN 200X)

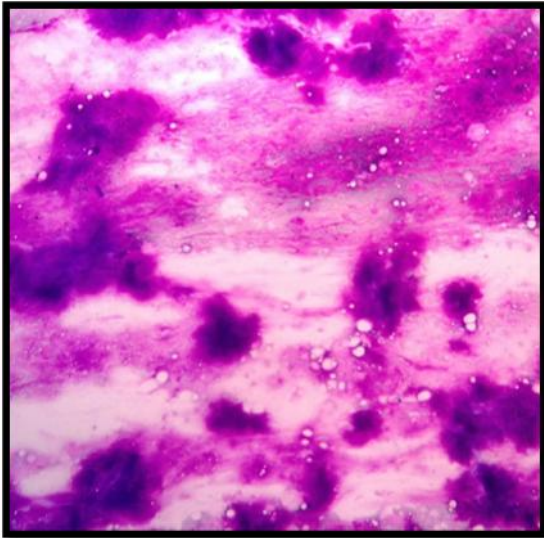


FIG 35-PHOTOMICROGRAPH SHOWING PLEOMORPHIC ADENOMA BY FNAC TECHNIQUE (GIEMSA STAIN 400X)

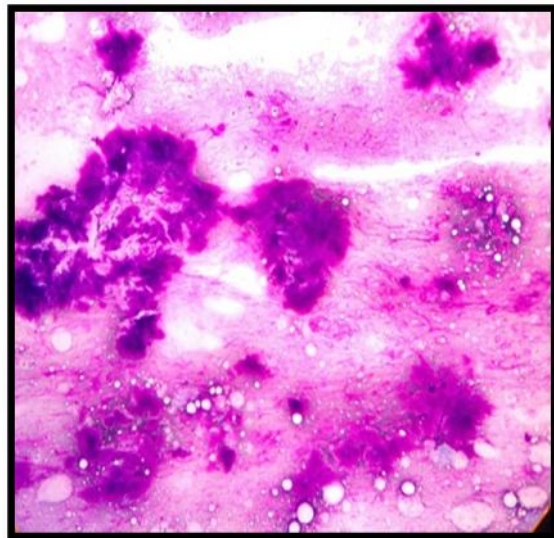


FIG 36-PHOTOMICROGRAPH SHOWING PLEOMORPHIC ADENOMA BY FNNAC TECHNIQUE (GIEMSA STAIN 400X)

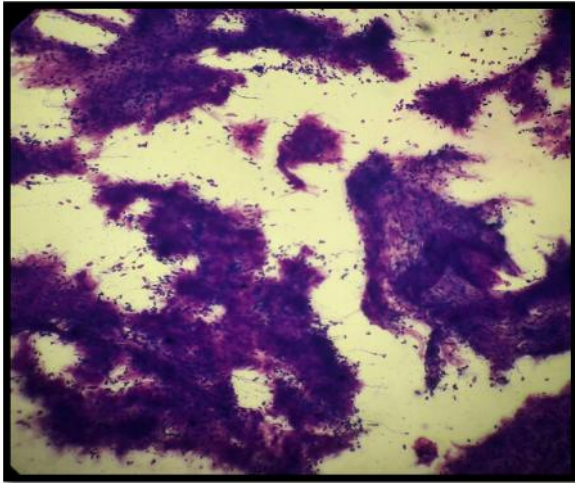


FIG 37- PHOTOMICROGRAPH SHOWING
SCHWANNOMA BY FNAC TECHNIQUE
(GIEMSA STAIN 100X)

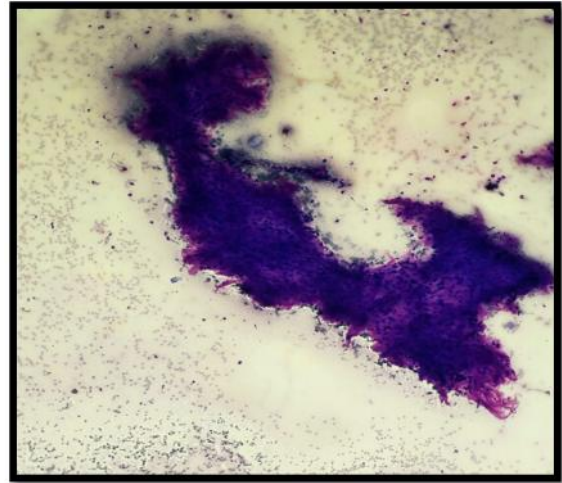


FIG 38- PHOTOMICROGRAPH SHOWING
SCHWANNOMA BY FNNAC TECHNIQUE
(GIEMSA STAIN 100X)

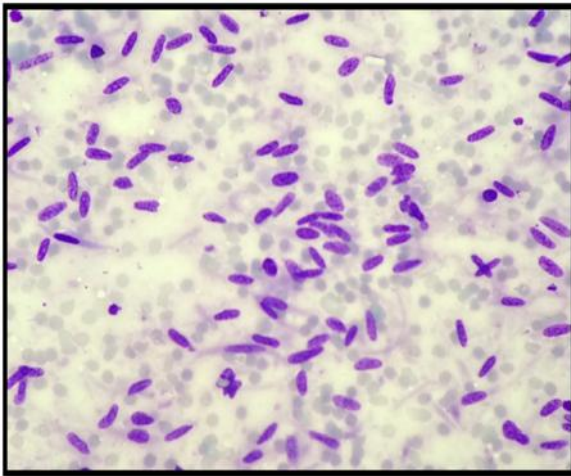


FIG 39- PHOTOMICROGRAPH SHOWING
MYOEPITHELIOMA BY FNAC TECHNIQUE
(GIEMSA STAIN 100X)

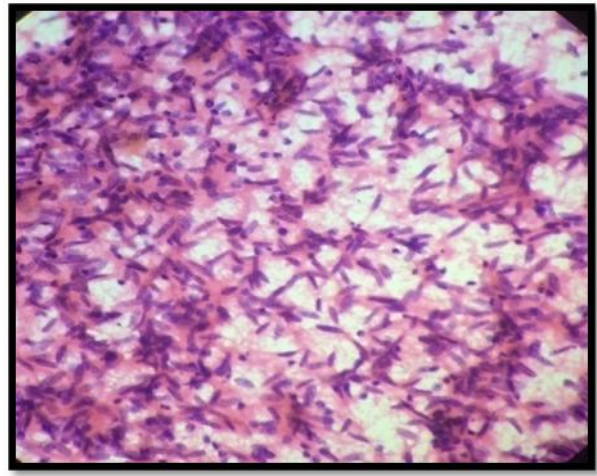


FIG 40- PHOTOMICROGRAPH SHOWING
MYOEPITHELIOMA BY FNNAC TECHNIQUE
(PAP STAIN 100X)

DISCUSSION

In the present study out of 90 cases of head and neck swellings, thyroid swelling was the largest lesion followed by lymph-node and 6 cases each of salivary gland and miscellaneous group. In a study done on “A comparative study of Fine-needle aspiration and Fine-needle non-aspiration techniques in head and neck swellings” by Srikant S *et al*¹ thyroid swelling was the commonest lesion followed by lymph-node swelling. Similar findings were noted in our study.

In a study done by Pinky P *et al*²⁶ and Malik NP *et al*²¹ on a comparative study of FNAC and FNNAC technique of thyroid disorders multinodular goitre was the commonest lesion. Our study findings were correlating with these author finding. In our study in thyroid aspirate background blood was more in FNAC than in FNNAC smears. Our results when compared with other authors study such as Chowhan A.K *et al*⁷, Mahajan P *et al*¹¹, Maurya A.K *et al*⁴, Malik P *et al*²¹ and Pinky P *et al*²⁶ study, for background blood was similar to their finding and these findings were also supporting the non-aspiration technique for thyroid swelling. In a study done by Ibrahim *et al*¹⁹ they have mentioned that in thyroid FNAC technique background blood was mainly because of the dilution of the cellular material with the blood. In our study also background blood was more by FNAC technique, similar explanation holds true in the present study.

In the present study cellular yield was also better with non-aspiration technique in thyroid swelling. Similar findings were noted in a study done by Maurya A.K *et al*⁴, Mahajan P *et al*¹¹, Pinky P *et al*²⁶ and Kaur S *et al*⁹ except Malik NP *et al*²¹ and Chowhan A.K *et al*⁷ who supported FNAC technique for cellularity.

In the present study cellular degeneration and cellular trauma was more with FNAC than FNNAC technique similar to the studies done by Mahajan P *et al*¹¹, Kaur

S *et al*⁹, Maurya A.K *et al*⁴ and Chowhan A.K *et al*⁷ but study done by Pinki P *et al*²⁶ revealed that lesser degree of cellular degeneration and trauma was by FNAC than by FNNAC.

In the present study better retention of architecture was noted with FNNAC than FNAC technique. These observations are similar to the studies done by Pinki P *et al*²⁶, Chowhan A.K *et al*⁷, and Mahajan P. *et al*¹², and Maurya A.K *et al*⁶ whereas Malik NP *et al*²¹ study revealed better architecture by aspiration technique when compared with non-aspiration technique.

In the present study in (Table 21) FNNAC out of 47 cases of thyroid 31 cases (66.0%) were diagnostically superior, 15 cases (31.9%) were diagnostically adequate and 1 case (2.1%) was insufficient for diagnosis, however in FNAC out of 47 cases 10 cases (21.3%) were diagnostically superior, 21 cases (44.7%) were diagnostically adequate and 16 (34.0%) cases were insufficient for diagnosis. In our study FNNAC yielded more diagnostically superior cases when compared with FNAC. Similar observation was noted in Chowhan A.K *et al*⁷, Pinky P *et al*²⁶ and Mahajan P *et al*¹¹ study.

In our study percentage of inadequate sample in FNAC thyroid was 34% and in FNNAC it was 2.1%. According to the study done by Pinky P *et al*²⁶ percentage of inadequate samples was less with FNCS (5%) than with FNA (16%) technique. This study findings were similar to our study. In a study done by Malik N.P *et al*²¹ the amount of cellularity was higher on FNAC in all diagnostic categories but the amount of background blood supported the non- aspiration technique. Retention of architecture was higher for FNAC than FNNAC. They also observed that FNAC yielded more diagnostically superior cases and FNNAC yielded more diagnostically adequate cases.

TABLE 21 – COMPARISON OF DIAGNOSTIC ADEQUACY OF FNAC AND FNNAC TECHNIQUE IN THYROID LESIONS.

| Performance | Pinky P <i>et al</i> ²⁶ (n=100) | | Malik P <i>et al</i> ²¹ (n=144) | | Chowhan A. <i>et al</i> ⁷ (n=200) | | Mahajan P <i>et al</i> ¹¹ (n=50) | | Present study (n=47) | |
|-------------------------------------------|-----------------------------------------------|---------------|-----------------------------------------------|---------------|-------------------------------------------------|---------------|------------------------------------------------|-------------|-------------------------|---------------|
| | FNAC | FNNAC | FNAC | FNNAC | FNAC | FNNAC | FNAC | FNNAC | FNAC | FNNAC |
| Diagnostically Inadequate (category 1) | 16 (16.0%) | 5 (5%) | 18 (12.5%) | 16 (11.1%) | 43 (21.5%) | 93 (46.5%) | 8 (16%) | 10 (20%) | 16 (34%) | 1 (2.1%) |
| Diagnostically Adequate (category 2) | 44 (44%) | 40 (40%) | 46 (32%) | 108 (75%) | 130 (65%) | 94 (47%) | 12 (24%) | 4 (8%) | 21 (44.7%) | 15 (31.9%) |
| Diagnostically Superior (category 3) | 40(40%) | 55 (55.0%) | 80 (55.5%) | 20 (13.9%) | 43 (21.5%) | 93 (46.5%) | 30 (60%) | 36 (72%) | 10 (21.3%) | 31 (66.0%) |

In present study in lymph-node cytology reactive lymphadenitis was the commonest lesion followed by granulomatous lymphadenitis. Out of 31 cases of lymph node 10 cases were of reactive lymphadenitis followed by 9 and 6 cases of granulomatous and suppurative lymphadenitis and only 3 cases of metastatic squamous cell carcinoma. In a study by Garg M *et al*²⁴ cases of reactive and tubercular lymphadenitis were equal comprising of 30% cases of lymph-node lesions. In a study done by Bharathi K *et al*²³, tubercular lymphadenitis were 30% and reactive lymphadenitis were of 28%. In their study metastatic squamous cell carcinoma and metastatic adenocarcinoma were 41%.

TABLE 22 – COMPARISON OF DIAGNOSTIC ADEQUACY OF FNAC AND FNNAC TECHNIQUE IN LYMPH-NODE LESIONS-

| PERFORMANCE | K Bharathi <i>et al</i> ²³ (n=100) | | Garg M <i>et al</i> ²⁴ (n= 50) | | PRESENT STUDY (n= 31) | |
|--------------------------------------------------|--------------------------------------------------|-------|----------------------------------------------|----------|--------------------------|-----------|
| | FNAC | FNNAC | FNAC | FNNAC | FNAC | FNNAC |
| DIAGNOSTICALLY SUPERIOR / ADEQUATE | 98% | 80% | 48 (96%) | 48 (96%) | 31 (100%) | 31 (100%) |
| UNSUITABLE FOR DIAGNOSIS. | 2% | 20% | 2 (4%) | 2 (4%) | 0 (0.0%) | 0 (0.0%) |

In a study done by Bharathi K *et al*²³ to compare the aspiration and non-aspiration technique in lymph-node cytology, diagnostic adequacy including superior quality smears of FNAC was 98% whereas for FNNAC it was 80%. However in the present study both FNAC and FNNAC yielded 100% diagnostic adequacy including diagnostically superior smears.

In the study done by Garg M *et al*²⁴ both FNAC and FNNAC yielded 96% diagnostically adequate cases including diagnostically superior cases. In the present study diagnostic adequacy was 100% for both the techniques. However diagnostically superior cases were 96% in FNAC and 80.6% in FNNAC.

Dey P *et al*³⁰ also did the study of comparison of FNNAC and FNAC technique in lymph-node, thyroid and breast and found that FNNAC is more adequate and better than FNAC technique.

On analysing the smears of lymph-node lesions obtained by both FNAC and FNNAC in the present study concluded that more diagnostically superior cases were from FNAC technique than FNNAC technique and more diagnostically adequate cases by FNNAC technique. In lymph-node lesions aspiration technique was superior to non-aspiration technique in the parameters of background blood, cellularity, and appropriate architecture and in total cumulative score. Regarding the individual criteria, in the present study FNAC technique performed significantly better in all the parameters except in the amount of cellular degeneration and trauma in which the scores were almost equal for both the techniques.

In the present study out of 6 salivary gland lesions 2 cases of pleomorphic adenoma followed by 1 case each of metastatic poorly differentiated squamous cell carcinoma, myoepithelioma, squamous cell carcinoma, sialadenosis. In a study done by Srikanth S *et al*¹, various lesions of salivary gland were pleomorphic adenoma, mucoepidermoid carcinoma, adenoid cystic carcinoma and chronic sialadenitis. In the present study FNNAC yielded better amount of cellular material as compared to FNAC. Similar findings were noted by Srikanth S *et al*¹.

In a study done by Dey P *et al*³⁰ in miscellaneous lesions total and average score was more with FNAC technique than with FNNAC technique. Similar findings were observed in our study. However in the present study salivary gland and miscellaneous samples was not adequate for conclusion.

CONCLUSION

FNAC is well established investigation used in the diagnosis of head and neck swelling. FNAC can cause bloody aspirate in highly vascular organs like thyroid hence a new modified technique called as FNNAC has been introduced.

Important advantages of FNNAC are easy operation, better perception of consistency of the swelling, and better tolerated by the patient. It is also better for cytological evaluation of vascular organs such as thyroid as it is less traumatic and produces less haemorrhagic aspirate.

In the present study in thyroid lesions diagnostically inadequate cases were more in FNAC technique, this was mainly because of the aspirated material diluted with the blood. However in lymph-node lesions diagnostically inadequate cases were not seen by both the techniques and in lymph- node lesions FNNAC techniques yielded lesser number of diagnostically superior cases as compared to FNAC technique. Thus in lymph-node lesions FNAC technique was better as compared to FNNAC technique. Non-aspiration combined with fine needle aspiration can result in better quality of cellular material in thyroid lesions.

Both the techniques have their own merits and demerits and neither is superior to the other. In order to maximise yield it may be appropriate to combine both the techniques to achieve better diagnostic accuracy.

LIMITATIONS OF STUDY-

- Study was time bound and the period was short hence sample size was small in salivary gland lesions and miscellaneous lesions. Diagnostic accuracy of FNAC and FNNAC technique in salivary gland lesions and miscellaneous group was not evaluated as the sample size was small.

SUMMARY

The present study included 90 cases of head and neck lesions by both FNAC and FNNAC techniques which was carried over a period of 21 months on patients of head and neck lesions referred to the cytology section of the Department of Pathology, BLDE University, Shri B.M.Patil Medical College, Vijayapur.

Maximum number of cases were seen in the age group of 16-30 years. Slight female preponderance with female to male ratio of 1.4:1 was noted.

Out of the 90 cases studied maximum cases were those of thyroid accounting for 47 (52.2%) cases followed by lymph-node lesions of 31 cases accounting for 34.4% and 6 cases each of salivary gland and miscellaneous group. The most common lesion of thyroid was multinodular/colloid goitre and in lymph node it was reactive lymphadenitis.

In thyroid lesions FNNAC technique was superior for the parameters of background blood, cellularity and retention of architecture. Total cumulative score in FNNAC was 343 whereas in FNAC it was 187 and the difference was statistically significant.

In lymph-node lesions cellularity and retention of architecture was better in FNAC technique than FNNAC technique and the background blood showed minimal difference between the two techniques. Total cumulative score in FNAC was 293 whereas in FNNAC it was 234. The difference was statistically significant.

After analysing all the lesions FNNAC technique was better in thyroid than FNAC technique, however in lymph-node lesions FNAC technique was better as compared to FNNAC technique.

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ANNEXURE-I

ETHICAL CLEARANCE



B.L.D.E. UNIVERSITY'S
SHRI.B.M.PATIL MEDICAL COLLEGE, BIJAPUR-586 103
INSTITUTIONAL ETHICAL COMMITTEE

INSTITUTIONAL ETHICAL CLEARANCE CERTIFICATE

The Ethical Committee of this college met on 22-11-2014 at 3:30 PM to scrutinize the Synopsis of Postgraduate Students of this college from Ethical Clearance point of view. After scrutiny the following original/corrected & revised version synopsis of the Thesis has been accorded Ethical Clearance.


Title "comparison of fine needle aspiration and fine needle non aspiration cytology in head and Neck swellings"

Name of P.G. student Dr. Nitasha Khawan,

Dept of pathology

Name of Guide/Co-investigator Dr. Surekha .C. Arakeri,

professor of pathology.

for 
DR. TEJASWINI VALLABHA
CHAIRMAN
INSTITUTIONAL ETHICAL COMMITTEE
BLDEU'S, SHRI.B.M.PATIL
MEDICAL COLLEGE, BIJAPUR.

Following documents were placed before E.C. for Scrutinization

- 1) Copy of Synopsis/Research project.
- 2) Copy of informed consent form
- 3) Any other relevant documents.

ANNEXURE-II
B.L.D.E.A'S SHRI B.M. PATIL MEDICAL COLLEGE HOSPITAL AND
CENTER, VIJAYAPUR – 586103.

RESEARCH INFORMED CONSENT FORM

TITLE OF THE PROJECT: “COMPARISON OF FINE NEEDLE ASPIRATION AND FINE NEEDLE NON ASPIRATION CYTOLOGY IN HEAD AND NECK SWELLINGS”

PRINCIPAL INVESTIGATOR : DR.NITASHA DHAWAN
P.G. DEPARTMENT OF PATHOLOGY

P.G.GUIDE : Dr. SUREKHA. U. ARAKERI _{M.D}
PROFESSOR,
DEPARTMENT OF PATHOLOGY

PURPOSE OF RESEARCH:

I have been informed that this study is done to know to access the efficacy of FNNAC technique in cytodagnosis of head and neck swelling by comparing cytomorphological features by fine needle aspiration and fine needle non aspiration cytology.

PROCEDURE: I understand that I will undergo detailed clinical history, thorough clinical examination and after which FNNAC followed by FNAC technique will be performed and subjected to cytological examination.

RISK AND DISCOMFORTS:

I understand that, I may experience some pain and discomfort during the examination of the lesion or during FNAC. This is mainly the result of my condition and procedures of this study are not expected to exaggerate these feelings which are associated with usual course of treatment.

BENEFITS: I understand that my participation in the study will have no direct benefit to me other than the potential benefit of the treatment.

CONFIDENTIALITY:

I understand that the medical information produced by the study will become a part of hospital record and will be subjected to confidentiality and privacy regulations of the hospital. If the data is used for publications the identity of patient will not be revealed.

REQUEST FOR MORE INFORMATION:

I understand that I may ask more questions about the study at any time.

REFUSAL FOR WITHDRAWAL OF PARTICIPATION

I understand that my participation is voluntary and that I may refuse to participate or may withdraw from the study at any time.

INJURY STATEMENT:

I understand that in the unlikely event of injury to me during the study I will get medical treatment but no further compensations.

I have read and fully understood this consent form. Therefore I agree to participate in the present study.

Participant / Guardian

Date:

Signature of Witness

Date:

I have explained the patient the purpose of the study, the procedure required and possible risk and benefit to the best of my ability in the vernacular language.

Investigator / P.G.

Date:

Witness to Signature

Date

ANNEXURE-III
CASE PROFORMA

Name:

Age:

Sex:

IP/OP:

Unit:

Cyto no:

Clinical presentation:

Past history:

Family history:

Personal history:

General physical examination:

Pallor

Lymphadenopathy

Icterus

Cyanosis

Clubbing

Oedema

Pulse rate:

Blood pressure:

Respiratory rate:

Systemic examination:

RS

CVS

Per abdomen

Clinical Diagnosis:

Cytomorphological features:

Cytology: Lesion: Site

Size

Number:

Nature of Aspirate:

Adequacy:

Microscopy:

| | Background Blood | Amount of cellular material | Degree of cellular trauma | Degree of Cellular Degeneration | Retention Of Appropriate Architecture |
|-------|------------------|-----------------------------|---------------------------|---------------------------------|---------------------------------------|
| FNAC | | | | | |
| FNNAC | | | | | |

Impression on cytology:

KEY TO MASTER CHART

| <u>Criterion</u> | <u>Quantitative description</u> | <u>Point score</u> |
|---------------------------------------------|------------------------------------------------------------------------------------------------------------------------------|--------------------|
| Background blood or clot | 1. Large amount ; great compromise to diagnosis | 0 |
| | 2. Moderate amount; diagnosis possible | |
| | 3. Minimal ; diagnosis easy; specimen of textbook quality | 1 2 |
| Amount of cellular material | 4. Minimal to absent, diagnosis not possible | 0 |
| | 5. Sufficient for cytodiagnosis | 1 |
| | 6. Abundant; diagnosis simple | 2 |
| Degree of cellular degeneration | 4. Marked ;diagnosis impossible | 0 |
| | 5. Moderate; diagnosis possible | 1 |
| | 6. Minimal ;good preservation, diagnosis easy | 2 |
| Degree of cellular trauma | 4. Marked ; diagnosis not possible | 0 |
| | 5. Moderate ; diagnosis possible | 1 |
| | 6. Minimal ; diagnosis obvious | 2 |
| Retention of appropriate architecture | 4. Minimal to absent ; not diagnostic | 0 |
| | 5. Moderate ; some preservation for example follicles, papillae, acini, flat sheets , syncytia or single cell patterns | 1 |
| | 6. Excellent architectural display closely reflecting histology diagnosis obvious | 2 |

MASTER CHART

| Sn | Lab No. | Name | Age | Sex | Site | DIAGNOSIS | BACKGROU ND BLOOD | | CELLULARI TY | | DEGREE OF CELLULAR DEGENERATI ON | | DEGREE OF CELLULAR TRAUMA | | RETENTION OF APPROPRIAT E ARCHITECTU RE | |
|----|-----------|---------------|-----|--------|-----------|-----------------------------|----------------------|-----------|-----------------|-----------|-------------------------------------------|-----------|---------------------------------|-----------|--------------------------------------------------------|-------|
| | | | | | | | FNA C | FNNA C | FNA C | FNNA C | FNA C | FNNA C | FNA C | FNNA C | FNA C | FNNAC |
| 1 | C/832/15 | Laxmibai | 37 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| 2 | C/830/15 | Gangabai | 45 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 1 |
| 3 | C/866/15 | Meenakshi | 48 | Female | Thyroid | Multinodular goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 4 | C/908/15 | Jakkam.b | 55 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| 5 | C/1701/14 | Mayawwa | 60 | Female | Thyroid | Medullary carcinoma | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 6 | C/1694/15 | Sudha | 20 | Female | Thyroid | Colloid goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 7 | C/1815/15 | Kashinath | 28 | Male | Thyroid | Colloid goitre | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 |
| 8 | C/1680/15 | Lalit | 40 | Female | Thyroid | Colloid goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 9 | C/793/15 | Indnati | 69 | Female | Thyroid | Hashimoto's thyroiditis | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 0 | 1 |
| 10 | C/2207/15 | Rajeshwari | 24 | Female | Thyroid | Papillary carcinoma | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 11 | C/2192/15 | Siddanagouda | 9 | Male | Thyroid | Colloid goitre | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 12 | C/2146/15 | Sarubai | 50 | Male | Thyroid | Colloid goitre | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| 13 | C/122/15 | Sudha rani | 25 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 14 | C/893/15 | Padmawwa | 55 | Female | Thyroid | Hashimoto's thyroiditis | 0 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 15 | C/984/15 | Sangeeta | 35 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| 16 | C/2191/15 | Lathashri | 19 | Female | Thyroid | Lymphocytic thyroiditis | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| 17 | C/2256/15 | Sangeeta | 24 | Male | Thyroid | Hashimoto's thyroiditis | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 2 |
| 18 | C/840/15 | Malappa | 25 | Male | Thyroid | Colloid goitre | 1 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 19 | C/2325/15 | Sushilarathod | 31 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 1 |
| 20 | C/2029/15 | Kamalabai | 42 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 1 |
| 21 | C/1717/15 | Siddhubha | 17 | Female | Lymphnode | Granulomatous lymphadenitis | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 22 | C/1718/15 | Karlinath | 14 | Male | Lymphnode | Reactive lymphadenitis | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 1 |

| | | | | | | | | | | | | | | | | |
|----|-----------|-----------------|----|--------|----------------|------------------------------------|---|---|---|---|---|---|---|---|---|---|
| 23 | C/1834/15 | Siddangauda | 86 | Male | Lymphnode | Metastatic squamous cell carcinoma | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 24 | C/1679/15 | Basamma | 50 | Male | Lymphnode | Necrotizing lymphadenitis | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 1 |
| 25 | C/2060/15 | Sharanappa | 43 | Male | Lymphnode | Reactive lymphadenitis | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 26 | C/2059/15 | Basappa b. | 30 | Male | Lymphnode | Tuberculous lymphadenitis | 1 | 2 | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 |
| 27 | C/2042/15 | Siddaram | 30 | Male | Lymphnode | Chronic granulomatous inflammation | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 28 | C/1848/15 | Chandrakar | 43 | Male | Lymphnode | Reactive lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 29 | C/1814/15 | Bharatikavsappa | 25 | Male | Lymphnode | Granulomatous lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 1 | 2 | 2 | 1 |
| 30 | C/1735/15 | Ravi halim | 28 | Male | Lymphnode | Necrotizing lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 31 | C/2095/15 | Kachappa | 25 | Male | Lymphnode | AccuteSuppurative lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 32 | C/770/15 | Basu | 32 | Male | Lymphnode | AccuteSuppurative lymphadenitis | 2 | 2 | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 1 |
| 33 | C/806/15 | Satarvakamatogi | 60 | Female | Lymphnode | Abscess | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 34 | C/985/15 | Satawwa | 60 | Female | Lymphnode | Abscess | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| 35 | C/919/15 | Renubai | 65 | Female | Lymphnode | AccuteSuppurative lymphadenitis | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| 36 | C/1018/15 | Kavita | 23 | Female | Lymphnode | Granulomatous lymphadenitis | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 |
| 37 | C/147/15 | Moneshwar | 20 | Male | Lymphnode | Reactive lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 38 | C/2058/15 | Darennabiradar | 15 | Male | Lymphnode | Reactive lymphadenitis | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 39 | C/2182/15 | Shivkumar | 14 | Male | Lymphnode | Chronic granulomatous inflammation | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 40 | C/2208/15 | Balaji | 22 | Male | Lymphnode | Reactive lymphadenitis | 2 | 1 | 2 | 1 | 1 | 1 | 2 | 2 | 2 | 1 |
| 41 | C/2095/15 | Rachappa | 25 | Male | Lymphnode | AccuteSuppurative lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 42 | C/2059/15 | Banepabharappa | 30 | Male | Lymphnode | Tuberculous lymphadenitis | 1 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| 43 | C/1707/15 | Krishanappa | 60 | Male | Lymphnode | Metastatic squamous cell carcinoma | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 |
| 44 | C/1725/15 | Shashinath | 50 | Male | Lymphnode | Reactive lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 45 | C/1728/15 | Rajeshwari | 45 | Female | Lymphnode | Reactive lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| 46 | C/1125/15 | Ranjana | 30 | Female | Lymphnode | Reactive lymphadenitis | 1 | 1 | 2 | 1 | 2 | 2 | 2 | 1 | 2 | 1 |
| 47 | C/845/15 | Surekha | 28 | Male | Salivary gland | Myoepithelioma | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| 48 | C/962/15 | Sumitra | 30 | Female | Salivary gland | Pleomorphic adenoma | 1 | 2 | 2 | 1 | 2 | 2 | 1 | 1 | 1 | 1 |
| 49 | C/982/15 | Piyush | 25 | Male | Salivary gland | Squamous cell carcinoma | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 50 | C/986/15 | Baganna | 2 | Male | Miscellaneous | Tuberculour abscess | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 51 | C/868/15 | Mallikarjun | 4 | Male | Miscellaneous | Epidermoid cyst | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |

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|----|-----------|----------------------|----|--------|----------------|-----------------------------|---|---|---|---|---|---|---|---|---|---|
| 52 | C898/15 | Kashinath | 28 | Male | Miscellaneous | thyroglossal cyst | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 53 | C/940/16 | Bhirappa | 45 | Male | Lymphnode | Reactive lymphadenitis | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 54 | C/941/16 | Nikita rathod | 26 | Female | Thyroid | Multinodular goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 55 | C/146/16 | Yamannappa | 50 | Male | Thyroid | Colloid goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 56 | C/213/16 | Saraswati | 25 | Male | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| 57 | C/225/16 | Supriya | 23 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| 58 | C/966/16 | Manjulapawar | 18 | Male | Thyroid | Colloid goitre | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 59 | C/927/16 | Paraveen | 43 | Male | Thyroid | Colloid goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 60 | C/917/16 | Mahadevi | 32 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |
| 61 | C/820/16 | Sharadahaveri | 24 | Female | Lymphnode | Necrotising lymphadenitis | 2 | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 62 | C/639/16 | Shankareppa | 56 | Male | Thyroid | Follicular carcinoma | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| 63 | C/1277/16 | Kavearijumanal | 28 | Female | Miscellaneous | Schwannoma | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 64 | C/1294/16 | Vasanthrathod | 68 | Male | Salivary gland | Squamous cell carcinoma | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 65 | C/1189/16 | Anushabaisunilrathod | 28 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 1 |
| 66 | C/1200/16 | Shantamma | 28 | Female | Thyroid | Colloid goitre | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 67 | C/1211/16 | Farjana | 30 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 2 | 1 | 2 | 1 | 2 | 1 | 2 |
| 68 | C/1292/16 | Sonubai | 22 | Female | Thyroid | Multinodular goitre | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 69 | C/1132/16 | Heenaawati | 25 | Female | Thyroid | Multinodular goitre | 0 | 2 | 1 | 1 | 0 | 2 | 0 | 2 | 0 | 1 |
| 70 | C/1059/16 | Sunanda | 28 | Female | Thyroid | Colloid goitre/ | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 1 |
| 71 | C/1049/16 | Indumati | 46 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 2 | 0 | 1 | 0 | 1 | 1 | 2 |
| 72 | C/1039/16 | Shobha | 22 | Female | Miscellaneous | Benign Cystic lesion | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 73 | C/1038/16 | Suvarana | 24 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 74 | C/1211/16 | Farjana | 30 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 75 | C/1111/15 | Shridevihugar | 28 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 76 | C/1053/15 | Suman | 46 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 |
| 77 | C/1018/15 | Kavita t | 23 | Female | Lymphnode | Granulomatous lymphadenitis | 2 | 2 | 2 | 1 | 1 | 1 | 1 | 1 | 2 | 1 |
| 78 | C/985/15 | Satawwa | 60 | Female | Miscellaneous | Abscess | 1 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 79 | C/984/15 | Sangeeta | 35 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 1 | 2 | 2 | 2 | 2 | 1 | 1 |
| 80 | C/1221/15 | Mallamma | 31 | Female | Thyroid | Diffuse toxic goitre | 1 | 2 | 1 | 1 | 1 | 2 | 1 | 2 | 1 | 1 |

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|----|-----------|-----------------------|----|--------|----------------|------------------------------------|---|---|---|---|---|---|---|---|---|---|
| 81 | C/1100/15 | Mallammahalegouda | 35 | Female | Lymphnode | Granulomatous lymphadenitis | 2 | 1 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 |
| 82 | C/1144/15 | Pramodbiradar | 35 | Male | Lymphnode | Metastatic squamous cell carcinoma | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 83 | C/2043/15 | Shivakkawalikar | 35 | Female | Thyroid | Hashimoto's thyroiditis | 0 | 1 | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 84 | C/2070/15 | Sujatapatil | 41 | Female | Thyroid | Multinodular goitre | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| 85 | C/2071/15 | Sharadahulageari | 45 | Female | Thyroid | Hashimoto's | 1 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| 86 | C/2104/15 | Shantammajari | 35 | Female | Thyroid | Colloid cyst | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 |
| 87 | C/2375/15 | Renukabasavarajmalagi | 28 | Female | Thyroid | Multinodular goitre | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |
| 88 | C/2537/15 | Panchappabiradar | 55 | Male | Salivary gland | Pleomorphic adenoma | 2 | 2 | 1 | 2 | 1 | 1 | 1 | 1 | 1 | 2 |
| 89 | C/2944/15 | Sujatababu | 35 | Female | Salivary gland | Sialadenosis | 2 | 2 | 1 | 2 | 2 | 2 | 2 | 2 | 1 | 2 |
| 90 | C/2988/15 | Manjulamudakappa | 27 | Female | Thyroid | Multinodular goitre | 0 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 1 | 2 |