



To Study the Role of FNAC in the Preoperative Diagnosis of Thyroid Lesions.

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ABSTRACT

Background

Thyroid nodules are the most common endocrine disorders particularly in countries where dietary iodine intake is Low. Thyroid enlargement requires a battery of investigations in which fine needle aspiration cytology (FNAC) has surpassed most of the other test, to study cytomorphological smear patterns, so that depending on it further management of the disease can be done either medically or surgically.

Objectives:

- To study cytomorphological smear patterns in various non-neoplastic and neoplastic thyroid disorders on FNAC.
- To compare the diagnostic efficacy of smears in fine needle aspiration.

Materials & Methods: A prospective study was done study the role of FNAC in the preoperative diagnosis of thyroid lesions in the department of Pathology in MM Institute of Medical Sciences & Research, Mullana, Ambala. Over a period of one year and included 80 Patients, A semi structured Performa was used USG Guided FNAC was done where it was required. Fine needle Sampling without Aspiration and Fine Needle Aspiration technique was used.

Two Types of staining used were Papanicolaou & May Grunewald Giemsa. **Results**For Cystic lesions FNAC is the procedure of choice, FNAC lead to spillage of contents. FNAC is cheap, easy to learn and well tolerated by children as well as adults. To increase the probability of a diagnostic sample both FNAC & FNCS should be used where one technique supplements the other. Among the solitary nodules, nodular goiter was most common benign thyroid lesion (22.5%), thyroiditis (11.25%), Multinodular goiter with cystic degeneration (10%), follicular neoplastic (8.75%), undifferentiated Carcinoma (2.25%) and (1.25%), Medullary Carcinoma (7.5%), Hurthle Cell Tumor (1.25%). **Conclusion:** FNAC of the thyroid is a useful tool for making a correct diagnosis in majority of cases based on clinic-cytological correlation Nature of organ and lesions has important bearing on the efficacy of sampling techniques. For cystic lesions, FNAC is the procedure of choice. FNCS would lead to spillage of contents. The choice of technique need to be selected, depending on anatomic site and clinical situation. FNCS is cheap, simple, easy to learn and leads to better perception of lesion. It is well tolerated by children as well as adults. For solid thyroid lesions, FNCS often yields specimen of text book quality.

KEYWORDS

Thyroid swellings, FNAC, FNCS

INTRODUCTION

Thyroid Nodules are the most common endocrine disorders particularly in countries where dietary iodine intake is low.¹ India has the world's biggest "Goiter Belt" in the Sub-Himalayan region where the prevalence may be as high as 40%. Besides the Sub-Himalayan region, many other states in India are endemic for goiter.² Thyroid enlargement whether nodular (solitary or multiple) or diffuse requires a battery of investigations. Beside history and physical examination, thyroid hormonal assay (T3, T4, TSH), transcutaneous ultrasonography, scintigraphy with I123 or Tc99m pertechnetate and fine needle aspiration cytology (FNAC) but FNAC has surpassed most of the other tests.³

FNAC has become an important diagnostic procedure in the management of thyroid abnormalities. As a diagnostic test FNAC can be used to diagnose most benign thyroid lesions like nodular goiter, cysts and thyroiditis and neoplasm like papillary, medullary, anaplastic, poorly differentiated and metastatic malignancy with high degree of accuracy based on cytomorphological features.³ It is a highly effective method of selecting the patients who requires surgery and thus avoids essentially diagnostic surgery.

The main objective of FNAC is to identify the thyroid nodules that can be left safely without surgery except carcinomas.⁶ By differentiating benign from malignant lesions, FNAC has resulted in an overall decline in the number of thyroidectomies to 40%.⁷

The aspiration technique generally employed is that of Karolinska

Institute.⁸ This involves the firm attachment of aspirating needle to a syringe usually held in specially designed syringe holder which enables single handed suction to be applied.⁹

The function of negative pressure is not to tear cells from the tissue but merely to hold the tissue against the sharp cutting edge of the needle which scrapes or cuts softer tissue components along the track as the needle advances through the tissue. However In high vascular tissue thyroid, lymph nodes, liver, spleen negative pressure is likely to mainly increase the amount of blood aspirated. Further, negative pressure is likely to distort the cellular morphology especially of the fragile tumor cells. In fibrous tissues with low cell count, the negative pressure assists in increasing the yield.¹⁰

This traditional or conventional technique of FNAC based on the observation that capillary pressure in fine needle is sufficient to keep the scraped cells inside the lumen. Obtaining cytological samples by using a fine needle without aspiration called Fine needle capillary sampling (FNCS) or Non-Aspiration (NA) cytology or Fine needle capillary biopsy (FNCB). The technique employing the insertion of fine needle into a lesion without attachment of a syringe depends on the property of capillary tension in the narrow channel. The physical principle is to state that a fluid or semi fluid was ascend spontaneously in a narrow tube in inverse proportion to the diameter of tube or capillary. The ascent of fluid into a narrow channel is governed by formula $h=2T/pgr$ where 'h' is the height attained 'T' is the surface tension of fluid, 'p' is the density of that fluid, and 'g' is the gravity and 'r' is the radius.¹¹ In this

technique, needle is held directly with the finger tips, inserted into the target lesion, moved back and forth in various directions at different depth, depending on the cellularity and vascularity of the tissue and then withdrawn. It is then attached to a syringe filled with the air and the smear is prepared in the usual manner.

Using this technique, the operator gets an excellent feel for the consistency of the tissue. This is a valuable piece of diagnostic information and improves precision in the sampling of small lesions. Another advantage is that admixture with blood is less than with aspiration. The technique is therefore particularly suited for lesions of thyroid and other vascular tissues.

REVIEW OF LITERATURE

In 1983, Suen and Quenville studied the role of FNAC in 304 patients, out of which 79 patients underwent surgery. The incidence of neoplasms among the surgically excised nodules was 85% (67 of 79) and the incidence of malignancy 47% (37 of 79). Sixty-five of the 67 thyroid neoplasms were diagnosed or suspected on FNAC. Two cases were missed. The sensitivity of the aspirations and the positive predictive value of the best were 97% and 91% respectively. They estimated that 268 operations would be required to salvage the same number of malignancies without the use of fine needle aspiration biopsy.¹³

In 1984, Ramacciotti et al assessed the diagnostic accuracy of FNAC of thyroid nodules in 111 patients who underwent thyroidectomy and in the three persons whose thyroid gland where examine at autopsy. The carcinoma (excluding incidental occult carcinoma) was found in 76% of nodules with malignant cytological findings (class 5 10/ 10; and class 4(3/7), 20 % (3/15) of the nodules with suspicious cytological findings (classes 1 and 2).

In 1986, Harsoulis et al studied the fine needle aspiration cytology in 1100 patients with nodular goiter. Surgery was performed in 213 patients based on clinical and cytological criteria and the histology of the surgical specimen was correlated with cytological findings. The results indicate that the overall sensitivity rate of the aspiration cytology method for cancer was 89.2% the diagnostic specificity 95.4%. The overall accuracy of the method was 94.2%¹⁵.

In 1987, Hamburger studied the role of FNAC in reducing the unnecessary surgery for thyroid nodules. He also studied the significance if repeat aspiration cytology in non-responding thyroid nodules to medical treatment. They studied that in 246 patients, diagnosis by repeat needle biopsy confirmed 85% of the original diagnosis by needle biopsy. Initial benign diagnosis by needle biopsy were confirmed for 187 (91 %) of 205 patients. Changes in diagnosis from benign to malignant by FNAC were made in six patients; five had surgery, all lesions were malignant. They concluded that repeat FNAC is preferable to routine surgery for nodules not responding to thyroxine.¹⁶

In 1987, Pak et al studied, no complications were observed following the aspiration procedure and all the patients tolerated the procedure well.¹⁷

In 1988, Santos and Leiman performed a more direct comparative analysis by sampling for 50 thyroid nodules by FNCS with simultaneous conventional FNAS serving as controls. The presence of blood or clot in smears was minimized using non aspiration technique. NA yielded diagnostically superior material in 44% as compared to 8% by FNA. They concluded that aspiration is not only unnecessary but also reduces the diagnostic yield.¹⁸

In 1988, Zazdela reported that failure rate with aspiration was 3.1 % as compared to 4.6% without aspiration in 306 thyroid tumors. He reported that cytological sampling without aspiration is also used for ploidy determination and for assessment of efficacy of treatment, steroidal hormonal assays in their institute.¹⁹

In 1989, Nunez and Mendelsohn studied inflammatory disease of thyroid gland formed 6.71% of the present study. In seven patients, where cytological diagnosis of Hashimoto thyroiditis was made, there were good numbers of Askanazy cells showing anisonucleosis. Histopathology was not possible in any of the

cases. Cytological diagnosis of lymphocytic thyroiditis was made in three cases and in one case where histopathological study was possible, proved it to be Hashimoto thyroiditis. Cytological features of Hashimoto thyroiditis, like Askanazy cells were not seen in these cases.²⁰

In 1989, Ciatto et al sampled 56 solid thyroid lesions with fine needle capillary sampling and 65 lesions of FNA. The inadequacy rate was 7% for FNC sampling while 18.5% for FNA sampling. The dilution of cellular material with blood seemed to be the main cause of higher rate of inadequacy by FNA. They suggested that fine needle capillary sampling should replace conventional FNA sampling of solid thyroid tumors since the former technique is simpler, cheaper and at least as effective in obtaining an adequate sample.²¹

In 1989, Aggarwal sk et al studied neoplastic lesions formed 14.82% of the total cases in the present study. Present study consisted of 18 cases (11.11%) of cytologically diagnosed follicular neoplasm. As reported by many authors, there was difficulty in distinguishing follicular adenoma from well differentiated follicular carcinoma. In this study, where histopathological study was possible in nine cases, five were follicular adenomas, three were nodular colloid goiter with adenomatous hyperplasia and one was papillary carcinoma. There was absence of diagnostic cytological features in these cases.²²

In 1989, Yue and Zheng extended the use of non-aspiration technique to intra-thoracic lesions. They demonstrated that as with superficial organs, fine needle sampling without aspiration of deep seated organs has a diagnostic accuracy similar to that of classic FNA method. FNC sampling produced sufficient cellular material, less trauma to tumor and surrounding tissues, quality of cells was equal to FNA and lung being vascular organ contamination with blood was less.²³

In 1991, Lucio et al studied the role of FNAC in 4609 patients who presented with solitary thyroid nodule as multinodular goiter from the year 1980 to 1988. They evaluated the accuracy and clinical usefulness of FNAC in the management of these patients. They concluded that FNAC can accurately assess the risk of cancer in a thyroid nodule.²⁴

In 1992, Bouvet et al studied whether the routine use of fine needle aspiration cytology reduces the rate of unnecessary surgery, the surgical pathology of 54 thyroidectomy patients who had preoperative FNAC was compared to the result obtain with 24 thyroidectomy patients who did not have preoperative FNAC. FNAC had a sensitivity of 93.5% and a specificity of 75%. The results indicates that the routine use of FNAC for patients with thyroid nodules reduces the incidence of unnecessary surgery.²⁵

In 1992, Godinho-Matos et al studied the role of FNAC in the management of thyroid diseases. Study on 144 patients showed 16% benign colloid goiter, 39% benign cystic goiter, 17% thyroiditis and 15% neoplasm's along with 13% unsatisfactory specimens and concluded as essential role of FNAC in the diagnosis and the management of 23% patients, a confirmatory role in 61% of the patients, a noncontributory role in 13% when specimens were inadequate.²⁶

In 1993, Busieniers and Oerter observed, cellular adenomatoid nodule (hyperplastic nodule), hyperplastic nodule/follicular neoplasm and follicular neoplasm form a continuous spectrum in terms of cellularity and presence of micro follicles, in increasing order, and background colloid, in decreasing order.²⁷

In 1995, Kumarasinghe and Sherif deenanalyzed 410 thyroid nodules, 127 breast lumps and 43 lymph nodes to compare the classical aspiration with the non- aspiration technique. The non-aspiration was superior to aspiration in sampling thyroid in all aspects. For lymph node sampling, both techniques showed equal results with regards to cellularity but non aspiration was superior in other aspects. They concluded that the technique needs to be selected depending on the anatomic site, the clinical situation, the personal experience and the preference of the operator.²⁸

In 1995, Roussel and Nouvet did evaluation of large needle biopsy for diagnosis of cancer. They concluded that as compared to FNA,

large needle biopsy does not offer any diagnostic advantage and increases the risk of tumor seedling along the needle track. They advocated that large needle biopsy should be replaced by fine needle biopsy, valuable in any anatomic situation and with any tumor type.²⁹

In 1996, Khan and Pandey determined the value of cytomorphological features and argyrophilic nucleolar organizer regions (AgNOR) in fine needle aspiration smears of thyroid nodules. Cytomorphological features were analyzed for frequency and predictive value in smears of 60 histologically confirmed cases of thyroid nodules, comprising 16 cases of papillary carcinoma, 19 cases of follicular adenoma, 5 of follicular carcinoma, 3 of medullary carcinoma and 17 of adenomatous goiter.³⁰ In 1997, Leonard and Melcher evaluated all the thyroid FNAC; done over a six years period to assess the accuracy and value of the technique. There were 335 FNACs of which 184 had subsequent histology and 49 other had clinical follow up, providing 233 patients for analysis. They concluded that FNAC has a high negative predictive value which is useful to reassure majority of the patients presenting with thyroid enlargement.³¹ In 1997, Sarda et al in an analysis of 546 cases of STN in an endemic area had a 10.8% prevalence of malignancy in STN with a higher prevalence in male patients. They suggested that FNAC had both diagnostic and therapeutic application in management of cystic thyroid nodules and surgery was advised only if the cysts recurred after one aspiration, or aspirated fluid cytology was positive for malignancy or if, after aspiration, a residual swelling persisted.³² In 1998, Kate et al sampled 600 superficial and 70 deep seated lesions by FNCS. The diagnostic adequacy in lymph node, breast and thyroid lesions was 95%, 91.07% and 90.09%. The diagnostic adequacy for deep seated lesions was 91.42%. They concluded that FNC sampling result in a high yield of good quality material with retention of cellular architecture i.e. specimens of text book like material but doubt persists with respect to fibrotic and cystic lesion.³³

In 1998, Al-Rikabi et al did a retrospective study from a teaching hospital in Riyadh on 479 patients to determine the cytological pattern of thyroid lesions and also evaluated the accuracy of FNAC as an initial diagnostic method in the investigation of these lesions by correlating with histological diagnosis. The result of FNAC showed 77.7% benign lesions, 5% of suspicious of malignancy, 5.2% malignant. Colloid and adenomatous nodules were the most common benign lesions (47.8%). Papillary Carcinoma was the most common malignant neoplasm (4.2%). FNAC accuracy was in the range of 94.4%, with a sensitivity of 78%, specificity of 100%, and negative predictive value of 93% and positive predictive value of 100%.³⁴

In 1999, Macdonald and Hossein determined the accuracy of cytological interpretation in the diagnosis of Hashimoto's thyroiditis. Out of 1638 FNAC's. Hashimoto's thyroiditis was suggested in 184 samples, among these, 39 had corresponding surgical specimens. In 27 (69%) aspirates, Hashimoto's thyroiditis was diagnosed on both FNAC and surgical specimens. In 10 of 27 FNAC's, an associated lesion was not sampled by FNAC. In 12(31%) FNAC's from nine patients, the cytologic diagnosis of Hashimoto's thyroiditis was not confirmed histologically. This resulted in five false-negative diagnoses. They concluded that the diagnoses of lymphocytic thyroiditis should not be made when only a few lymphocytes are present and pleomorphic hurthle cells may be present in hurthle cell neoplasm and underdiagnosed as HT.³⁵

In 2000, Castro and Hossein studied the epidemiology, evaluation and treatment of various types of thyroid nodules and outlined the appropriate diagnostic steps. FNAC is the single most important procedure for differentiating benign from malignant thyroid nodules. Ultrasonography, scintigraphy and radioiodine scanning, together with measurement of various tumour markers, are useful adjuncts in the preoperative management of patients with thyroid cancer. A carefully thought-out management plan can help reduce the risk of unnecessary surgery in these patients.³⁶

In 2001, Gupta et al studied 470 out of 507 cases were benign, 30 malignant and seven were inconclusive. The cytological diagnoses included cases of goiter, thyroiditis, thyroid cyst, thyroglossal cyst, adenomas, ectopic thyroid, medullary carcinoma, papillary carcinoma, anaplastic carcinoma, follicular carcinoma, Hurthle cell carcinoma and minimally invasive carcinomas. The specificity and sensitivity was found to be 99.2% and 89.47% respectively with a diagnostic accuracy of 97.93%.³⁷

In 2001, Arda, et al studied the role of FNAC of thyroid nodules in 46 children and compared the results with ultrasonography, radionuclide scanning and histopathological reports. The statistical analysis revealed sensitivity, specificity, accuracy, positive and negative predictive values as 100%, 95%, 67% and 100% for FNAC which was higher as compared to ultrasonography and radionuclide scanning. They concluded that FNAC is as reliable in children as in adults for the definitive diagnosis of thyroid nodules and thus avoids unnecessary surgeries.³⁸

In 2002, Mitra undertook Fine needle aspiration of the thyroid gland, followed by cytological studies and their correlation with histopathological diagnosis to assess the effectiveness of fine needle aspiration cytology in diagnosing disorders of this gland. Out of the total 100 patients studied 28 were cases of simple colloid goiter, 17 of adenomatoid goiter, 10 of autoimmune thyroiditis ranging from lymphocytic thyroiditis to Hashimoto's thyroiditis, 28 of follicular neoplasia, 10 of papillary carcinoma, one of medullary carcinoma, 2 of anaplastic carcinoma and 4 of cystic lesions of the thyroid gland. Although, fine needle aspiration cytology of the thyroid gland was diagnostic in 75% of cases, it did not correlate with the histopathological diagnosis in the remaining 25% of cases.³⁹

In 2005, Mathur et al assessed the accuracy of FNAC in the diagnosis of goiter and highlighted its limitations and diagnostic pitfalls by doing a study on 771 cases over a five year period. The study showed cytological and histological concordance in 77.38% cases and in 20.2% cases, no diagnosis could be made because of cystic change. Sampling errors were mainly responsible for this false-negative case.⁴⁰

In 2005, Deshpande studied cytology of anaplastic thyroid carcinoma in 35 cases. They advised that aspiration should be repeated if initial aspiration yields inadequate specimen.⁴¹ In 2006, Musa et al evaluated the role of FNAC and correlated with histological diagnosis during the period of ten years. a total of 69 cases were studied. Benign diseases were 34 nodular colloid goiter, 6 toxic goiter, 7 follicular adenoma, 2 cases each of Hashimoto's and subacute thyroiditis. They concluded that FNAC is sensitive, specific, accurate and the initial investigation of thyroid diseases.⁴² In 2007, Tublin et al performed ultrasound guided FNA and FNCS in 88 and 92 thyroid nodules, respectively. FNA was diagnostic in 78 (89%) of 88 nodules and non-diagnostic in 10 (11 %) of 88 nodules; FNCS was diagnostic in 80 (87%) of nodules and non diagnostic in 12 (13%) of 92 nodules. The differences in percentages of cytological adequacy rates between both techniques were not statistically significant. They concluded that ultrasound guided FNA and FNCS result in comparable diagnostic cytological adequacy rates. Both techniques are easily mastered, but ultrasound guided FNCS is much faster, simpler procedure.⁴³ In 2008, Guhamallick et al studied the effectiveness of cheap and simple procedure of FNAC for diagnosis of thyroid lesions. He reported 14% of the cases could not be assessed because of inadequate aspiration. However the sensitivity and specificity for diagnosis of malignant lesions were 92.7% and 98.2% respectively and overall cytohistological correlation was achieved in 82.66% of all cases.⁴⁴

In 2010, Prachi and Sharma studied fine needle aspiration versus Non - aspiration technique of cytodiagnosis in thyroid lesions and prepared a scoring (0, 1 & 2) using five objective parameters which includes background blood or clot, amount of cellular material, degree of cellular degeneration, degree of cellular trauma and

retention of appropriate architecture. Non – aspiration performed better than FNAC for criteria background blood or clot and retention of appropriate architecture with statistically significant difference. Non-aspiration also scored better than FNAC for the other parameters as well as cumulatively.⁴⁵

AIMS AND OBJECTIVES

- To use FNAC as a diagnostic tool in various thyroid lesions
1. To study cytomorphological smear patterns in various non-neoplastic and neoplastic thyroid disorders on FNAC.
 2. To compare the diagnostic efficacy of smears in fine needle sampling (Non-Aspiration) and fine needle aspiration.

MATERIALS AND METHOD

The present prospective study was undertaken to study the role of FNAC in the preoperative diagnosis of Thyroid lesions in the Department of Pathology in M.M. Institute of Medical Sciences & Research, Mullana, Ambala over a period of one year which included eighty patients. A semi structural Performa was used. In patients where USG guided FNAC was required, the use of ultrasonography was done.

TECHNIQUE

- A. Fine Needle Sampling without Aspiration
- B. Fine Needle Aspiration:

Staining:

For Papanicolaou staining, smears were wet fixed in isopropyl alcohol or ethyl alcohol and ether in equal parts.
For May Grunewald Giemsa staining, smears were air dried.

OBSERVATIONS

The present study was carried out in the Post-graduate department of Pathology, M.M. Institute of Medical Science & Research, Ambala, over a period of one year. A total of 80 patients who presented with swelling thyroid were subjected to both FNAC & FNS and cytomorphological study of the smear was done and diagnostic efficacy of smears in FNAC & FNS was compared.

TABLE – 1

(a) DISTRIBUTION ACCORDING TO SOLITARY SWELLING

| NATURE OF SWELLING | TOTAL NO. OF PATIENTS =38 | PERCENTAGE |
|--------------------|---------------------------|------------|
| MALIGNANT | 12 | 31.5% |
| BENIGN | 26 | 68.4% |

P value >0.05

(b) MULTINODULAR SWELLING.

| NATURE OF SWELLING | TOTAL NO. OF PATIENTS | PERCENTAGE |
|--------------------|-----------------------|------------|
| MALIGNANT | 0 | -- |
| BENIGN | 16 | 100% |

P value <0.01

(C) DIFFUSE SWELLINGS

| NATURE OF SWELLING | TOTAL NO. OF PATIENTS | PERCENTAGE |
|--------------------|-----------------------|------------|
| MALIGNANT | 12 | 46.1% |
| BENIGN | 14 | 54% |

BENIGN 1454% P value <0.05

TABLE – 2

DISTRIBUTION ACCORDING TO PLASMACYTOID CELLS

| NATURE OF SWELLING | NUMBER OF PATIENTS | PRESENCE OF PLASMACYTOID CELLS | PERCENTAGE |
|--------------------|--------------------|--------------------------------|------------|
| MALIGNANT | 24 | 7 | 29% |
| BENIGN | 56 | -- | 0 |
| TOTAL | 80 | 7 | -- |

X² value 18.67 and P value < 0.001

TABLE – 3

DISTRIBUTION ACCORDING TO ADEQUATE CELLULARITY IN NON-ASPIRATION TECHNIQUE

| NATURE OF SWELLING | NUMBER OF PATIENTS | PRESENCE OF ADEQUATE CELLULARITY | PERCENTAGE |
|--------------------|--------------------|----------------------------------|------------|
| MALIGNANT | 24 | 21 | 88% |
| BENIGN | 56 | 36 | 64% |
| TOTAL | 80 | 57 | 71% |

X² value 4.41 and P value <0.05

TABLE - 4

DISTRIBUTION ACCORDING TO INADEQUATE CELLULARITY IN NON-ASPIRATION TECHNIQUE.

| NATURE OF SWELLING | NUMBER OF PATIENTS | INADEQUATE CELLULARITY | PERCENTAGE |
|--------------------|--------------------|------------------------|------------|
| MALIGNANT | 24 | 3 | 13% |
| BENIGN | 56 | 20 | 36% |
| TOTAL | 80 | 23 | 29% |

X² value 4.41 and P value < 0.05

TABLE – 5

DISTRIBUTION ACCORDING TO CELLULARITY IN ASPIRATION TECHNIQUE

| NATURE OF SWELLING | NUMBER OF PATIENTS | ADEQUATE CELLULARITY | PERCENTAGE |
|--------------------|--------------------|----------------------|------------|
| MALIGNANT | 24 | 3 | 13% |
| BENIGN | 56 | 20 | 36% |
| TOTAL | 80 | 23 | 29% |

X² value 4.41 and P value < 0.05

TABLE – 6

DISTRIBUTION ACCORDING TO INADEQUATE CELLULARITY IN FNA TECHNIQUE

| NATURE OF SWELLING | NUMBER OF PATIENTS | INADEQUATE CELLULARITY | PERCENTAGE |
|--------------------|--------------------|------------------------|------------|
| MALIGNANT | 24 | 21 | 88% |
| BENIGN | 56 | 36 | 64% |
| TOTAL | 80 | 57 | 71% |

X² value 4.41 and P value < 0.05

DISCUSSION

The present prospective study was undertaken to study the role of FNAC in the preoperative diagnosis of Thyroid lesions in the Department of Pathology in M.M. Institute of Medical Sciences & Research, Mullana, Ambala over a period of one year.

A semi structured proforma was used.

The two techniques used were fine needle sampling and fine needle aspiration. In this study 80 patients were taken into

consideration, in whom both FNAC & FNS was done to find out the cytomorphological smear patterns in various non-neoplastic and neoplastic thyroid disorders, and to compare the diagnostic efficacy of smears in fine needle sampling (Non-Aspiration) and fine needle aspiration.

In the study females were found to be affected more than males in thyroid disorders. Female to male ratio was 7:1. Same was found by Hamburger J in 1987 who observed female: male is 8:1 among his 246 patients. 23 Hawkins et al in 1987 found ratio of 9:1 among 1399 patients.⁴⁵

Table 7: Pattern of Thyroid Lesions

| S.NO | STUDY | NODULAR GOITER | THYROIDITIS | NEOPLASM |
|------|---|----------------|-------------|----------|
| 1 | Yeah GPS and Chan KW (1999) ⁴⁶ | 77% | 4.80% | 9% |
| 2 | Khan S et al (2004) ⁴⁷ | 71% | 11% | 9% |
| 3 | Present study | 60% | 11.25% | 21.25% |

The above table shows studies in accordance with the present study. Both the studies show preponderance of nodular goiter which is in accordance to the present study. Yeah GPS shows neoplastic lesions to be more common than the thyroiditis⁴⁶ as is in the present study while on the contrary Khan et al showed thyroiditis to be more common than the neoplastic lesions.⁴⁷ This discordance might be because of environmental factors. In present study, out of 80 patients, Nodular goitre was observed in 18 cases (22.5%) but Das (1999) observed 77%. Also, concluded that detailed cytological assessment of FNA smears in solitary nodular goiter was helpful in highlighting various parameters that differentiate between various types of goiters.⁴⁸

In present study, it was found Multinodular goitre with cystic degeneration in 8 cases (10%), Thyroiditis in 9 cases (11.25%), Follicular neoplasms in 7 cases (8.75%), Papillary carcinoma in 1 case (1.2%), Papillary carcinoma with cystic degeneration in 1 case (1.2%), Medullary carcinoma in 6 cases (7.5%), Hurthle cell tumour in 1 case (1.2%) and undifferentiated in 2 cases (2.5%) were found. Das did FNAC's of solitary nodular goiter in 441 cases and studied the cytomorphological features. Various parameters used for cytologic assessment included cellularity, colloid papillary formation, hurthle cells acinar formation and inflammatory cells were used.⁴⁸ This is in consistent with present study which was done on 80 patients.

In present study FNCS yielded specimen of superior text book quality in thyroid lesions in more number of cases 71% as compared 29% by FNAC. The cumulative score as well as mean score for individual criteria studied was more for FNCS i.e. amount of material was more with less contamination of cellular morphology and architecture.

Kate et al (1998) also describe FNCS to be yielding diagnostically superior or text book like material. This was mainly because dilution of cellular material with blood is the main cause of more number of inadequate smears by FNAC. This is minimal with fine needle capillary sampling because of spontaneous ascent of material by capillary action and significant reduction in trauma to the lesion and surrounding tissue.⁴⁹

In present study with fine needle sampling, 23 out of 80 patients which constituted 29% of the total showed bloody cellularity i.e. more of blood contamination in comparison to FNAC which showed 71% of blood contamination.

Kumarasinghe and Sheriffederen in 1995⁴⁷ also showed non-aspiration superior to aspiration in sampling thyroid in all aspects. They also concluded that the technique needs to be selected

depending on the anatomic site, the clinical situation, the personal experience and the preference of the operator. Present study is also consistent with study of Kumara Singh and Sheriffederen in 1995⁵⁰ who also reported that non- aspiration was superior to aspiration in sampling thyroid lesions.

In contrast to Kung (1990)⁵¹ did not find excess of blood to be problem because they applied air dried rehydration techniques which would lyse the red blood cells leaving the nucleated cells against a clear background. He used 10 ml syringe and creates a vacuum of only 2-3 ml increasing to 5 ml only if the tissue is fibrotic and a low cellular yield is accepted.

Present study was consistent with Prachi Mahajan et al⁴⁴ who studied fine needle aspiration versus Non-aspiration technique of cytodagnosis in thyroid lesions, found that Non-aspiration performed better than FNAC for criteria background blood or clot and retention of appropriate architecture with statistically significant difference.

Present study is consistent with Raghuveer CV et al who studied fine needle aspiration cytology versus fine needle sampling without aspiration and showed that fine needle sampling had better yield than fine needle aspiration.⁵² Also fine needle sampling without aspiration has an obviate the use of suction and depends solely on capillary action of the fine needle and is therefore much less painful, much less traumatic and thus much more patient friendly.

Present study is in contrast with Pothier D Dand Narula A Awhocompared the effectiveness of two biopsy sampling methods, fine-needle aspiration cytology (FNAC) and sampling without aspiration (FNS), for diagnosis of thyroid lesions. Meta-analysis provides no evidence that one biopsy sampling method is better than the other.⁵³ But sampling without aspiration proved to be better and easier method to diagnose various thyroid lesions as compare with fine-needle sampling.

Guhamallick M et al studied the effectiveness of cheap and simple procedure of FNAC for diagnosis of thyroid lesions. He reported 14% of the cases could not be assessed because of inadequate aspiration. Present study shows that, with FNS technique 88% of the total malignant swelling showed adequate cellularity. 29% of the total cases showed inadequate cellularity with FNS technique.⁵⁴ Present study was in contrast with Akhtar et al who concluded that there is no significant difference in amount of cellularity obtained by two techniques. But in present study cellularity obtained by fine needle sampling is inadequate as compare with fine needle aspiration.⁵⁵

Table 8: Comparative incidence of non-neoplastic and neoplastic lesions in different studies

| Studies | Non-neoplastic | Neoplastic | Ratio |
|--------------------------------|----------------|------------|-------|
| Khadiolkar UN ⁵⁹ | 66 | 34 | 2:1 |
| Dorairajan N ⁶⁰ | 80 | 20 | 4:1 |
| Popat VC ⁵⁶ | 21 | 11 | 2:1 |
| De los Santos ET ⁵⁷ | 184 | 37 | 5:1 |
| Present study | 56 | 24 | 2.3:1 |

The above table shows that the present study is in accordance with the other studies in regard to the preponderance of the non-neoplastic lesions in comparison to the neoplastic ones. Khadiolkar UN et al in their study of 100 cases reported 66% non-neoplastic and 34% neoplastic. Among the neoplasms, 21% were malignant and 13% were benign. Involucional colloid nodule was the predominant type of solitary nodule (52%). Among the malignant neoplasms, papillary carcinoma was the commonest

solitary nodule (13%). 59 Mitra RB in his study of 100 patients, came out with results which were in contrast with present study. In his study, 28 cases of simple colloid goiter, 17 of adenomatoid goiter, 10 of autoimmune thyroiditis ranging from lymphocytic thyroiditis to Hashimoto's thyroiditis, 28 of follicular neoplasia, 10 of papillary carcinoma, one of medullary carcinoma, 2 of anaplastic carcinoma and 4 of cystic lesions of the thyroid gland.⁶¹

SUMMARY AND CONCLUSION

Fine needle sampling is important diagnostic modality in sampling of superficial as well as deep seated lesions. The present study compared two techniques of fine needle sampling i.e. fine needle aspiration and fine needle capillary sampling in superficial lesions.

The following conclusions were drawn from the present study: -

- 1) Nature of organ and lesion has important bearing on the efficacy of sampling techniques.
- 2) For cystic lesions, FNAC is the procedure of choice. FNCS would lead to spillage of contents.
- 3) The choice of technique need to be selected depending on anatomic site and clinical situation.
- 4) FNCS is cheap, simple, easy to learn and leads to better perception of lesion. It is well tolerated by children as well as adults.
- 5) For solid thyroid lesions, FNCS often yields specimen of text book quality.
- 6) TO increase the probability of a diagnostic sample, both FNAC and FNCS may be used in selected cases in which one technique supplements the other.
- 7) Thyroid lesions were more frequently seen in females.
- 8) 38% patients presented with solitary enlargement of thyroid, 26% presented with diffuse enlargement of thyroid, while 16% had multinodular goitre, on palpation.
- 9) Among solitary nodules, nodular goiter was the most common benign thyroid lesion, comprising of 18 cases(22.5%); followed by nodular goiter with cystic degeneration, 17 cases (21.25%), thyroiditis, 9 cases (11.25%), multinodular goiter with cystic degeneration, 8 cases(10%), follicular neoplasm, 7 cases (8.75%), medullary carcinoma, 6 cases (7.5%), Inflammatory lesions, 5 cases (6.25%), multinodular goiter, 3 cases (3.75%), undifferentiated carcinoma, 2 cases (2.5%) and papillary carcinoma, 1 case(1.25%).
- 10) Follicular neoplasm was the commonest among tumours, comprising of 7 cases (8.75%) showing micro follicles, nuclear crowding, nuclear overlapping and absence of colloid on FNAC.
- 11) Medullary carcinoma was seen in 6 cases (7.5%) on FNAC showing cytomorphological features of plasmacytoid cells, spindle cells along with red granularity in the cytoplasm and amyloid like material.
- 12) Papillary carcinoma was cytologically diagnosed in 2 cases (2.5%) with classic morphological feature of papillae, intranuclear inclusions, nuclear grooves and powdery chromatin in 100 % cases.
- 13) Hurthle cell tumour was seen in 1 case (1.25%) on FNAC showing sheets of hurthle cells and absence of colloid.
- 14) 71% of patients showed adequate cellularity with FNS technique where as 36% of the patient showed adequate cellularity by Fine Needle aspiration technique. 71% (out of 80) showed inadequate cellularity in FNAC in comparison to 29% with FNCS technique.

Conclusion:

FNAC of the thyroid is a useful tool for making a correct diagnosis in majority of cases based on clinic-cytological correlation. Nature of organ and lesions has important bearing on the efficacy of sampling techniques. For cystic lesions, FNAC is the procedure of choice. FNCS would lead to spillage of contents. The choice of technique need to be selected, depending on anatomic site and clinical situation. FNCS is cheap, simple, easy to learn and leads to better perception of lesion. It is well tolerated by children as well as adults. For solid thyroid lesions, FNCS often yields specimen of text book quality. To increase the probability of a diagnostic sample, both FNAC and FNCS may be used in selected cases in which 1 technique supplements the other. In present study FNCS yielded specimen of superior text book quality in thyroid lesions as compared to FNAC. In FNCS amount of material was more with less contamination of cellular morphology and architecture. This was mainly because of the fact that dilution of cellular material with blood is the main cause of more number of inadequate smears by FNAC. This is minimal with FNCS because of spontaneous ascent of material by capillary action and significant reduction in trauma to the lesion and surrounding tissue.

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