

A study of cytomorphological features in various thyroid lesions

Dr. Rashmi Kunder

Assistant Professor, Department of Pathology, Srinivas Institute of Medical Sciences,
Mangalore, Karnataka, India

**Corresponding Author:
Dr. Rashmi Kunder**

Abstract

Thyroid lesions are one of the common conditions encountered in clinical practice. The diseases of thyroid are of great importance because most of them are amenable to medical or surgical treatment. Often it is difficult to make an accurate diagnosis by clinical evaluation alone. Hence Fine Needle Aspiration Cytology (FNAC) study of such lesions along with clinical evaluation is emphasized in order to aid towards accurate diagnosis. A uniform reporting system for thyroid FNA will facilitate effective communication among cytopathologists, endocrinologists, surgeons, radiologists, and other health care providers. Also, it will facilitate cytologic-histologic correlation for thyroid diseases, facilitate research into the epidemiology, molecular biology, pathology and diagnosis of thyroid diseases, particularly neoplasia and allow easy and reliable sharing of data from different laboratories for national and international collaborative studies. The present study aims at diagnosing various thyroid diseases based upon cytomorphological features in FNAC.

Keywords: Cytomorphological, thyroid, lesion, malignant, benign

Introduction

Thyroid lesions are one of the common conditions encountered in clinical practice. The diseases of thyroid are of great importance because most of them are amenable to medical or surgical treatment^[1]. Often it is difficult to make an accurate diagnosis by clinical evaluation alone. Hence Fine Needle Aspiration Cytology (FNAC) study of such lesions along with clinical evaluation is emphasized in order to aid towards accurate diagnosis. As all palpable lesions can be assessed by FNAC technique, early diagnosis is often possible^[2]. FNAC is a diagnostic tool in which cells are aspirated from a palpable swelling using syringe and fine needle. It is a simple, minimally traumatic and an ideal first line diagnostic test. It is also a speedy and an accurate technique being used worldwide^[2]. The number of noninvasive diagnostic tests and surgical lobectomies done to establish or exclude thyroid cancer, makes it a disease of economic importance. Living in a society concerned with containment of medical costs, we should carefully select the most cost-effective diagnostic tests and hence FNAC is being increasingly used for evaluation of thyroid swellings^[3]. With this rapid diagnostic technique, costly days in hospital can be saved. The whole procedure, including fixation and staining is quick and a report can be issued within hours. The immediate diagnosis relieves patient's anxiety and saves time. A definitive treatment can be planned in advance^[2]. FNAC examination has proved to be a simple, accurate, safe and cost-effective method for the preoperative diagnosis of benign and malignant thyroid nodules^[4]. Its use has decreased the number of thyroid surgeries performed and increased the ratio of malignant to benign lesions resected. As a result, many thyroid 2 surgeries for benign diseases have been avoided^[5]. The clinical value of thyroid FNAC is useful in the diagnosis of inflammatory, infective and neoplastic conditions^[1]. Though not a substitute, it is an extremely valuable complement to surgical histopathology. Today FNAC is a well-established procedure and a valuable tool in the diagnosis and management of the patients with thyroid lesions^[2]. Different imaging techniques are now used for preoperative diagnosis of thyroid nodules like radionuclide

scanning, high-resolution ultrasonography (USG). However, FNAC is still regarded as the single most accurate and cost-effective procedure particularly if ultrasound is used as a guide for better sample collection, especially for cystic lesions^[6]. During the last decade, confidence in FNAC as a reliable test has grown considerably and it has emerged as a most direct accurate diagnostic procedure in the management of nodular thyroid disease, gaining world-wide acceptance^[2]. FNAC requires careful aspiration technique and interpretation of the cytological findings. Most practitioners rely on FNAC alone, especially for the first attempt at diagnosis^[7]. To address terminology and other issues related to thyroid FNA, the National Cancer Institute (NCI) hosted “The NCI Thyroid Fine Needle Aspiration State of the Science Conference”. The meeting was organized by Andrea Abati, MD and it took place on October 22 and 23, 2007 in Bethesda. The NCI conference participants acknowledged the importance of developing a uniform terminology for reporting thyroid FNA results. An inspiration for this proposal was the Bethesda System for reporting cervical cytology interpretations, which was first developed at NCI workshop in 1988. The conclusions regarding terminology and morphologic criteria from the NCI meeting led to the Bethesda Thyroid Atlas Project and form the 3 framework for The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC) which recommends six diagnostic categories^[8]. A uniform reporting system for thyroid FNA will facilitate effective communication among cytopathologists, endocrinologists, surgeons, radiologists and other health care providers. Also, it will facilitate cytologic-histologic correlation for thyroid diseases, facilitate research into the epidemiology, molecular biology, pathology and diagnosis of thyroid diseases, particularly neoplasia and allow easy and reliable sharing of data from different laboratories for national and international collaborative studies^[8]. The present study aims at diagnosing various thyroid diseases based upon cytomorphological features in FNAC.

Aims and Objectives

To study the cytomorphological features in various thyroid lesions.

Materials and Methods

The present study was undertaken to analyze the role of fine needle aspiration cytology in the cytomorphological features of various thyroid lesions.

The study was undertaken in the Department of Pathology, Srinivas Institute of Medical Sciences, Mangalore from Jan 2017 to Jan 2018. The study comprised of 704 patients who presented with the history of swelling in neck which were referred from All patients reporting to Srinivas Institute of Medical Sciences with thyroid swelling in whom FNAC was done the Departments of Surgery, Medicine & ENT were included in the study and patients who have had surgery at this Institute but FNAC was not performed preoperatively for thyroid swelling were excluded.

In all prospective cases, all the patients were clinically examined in detail according to the proforma and a careful palpation of the thyroid gland was done according to the following procedure and the location of the gland for aspiration was judged precisely.

1. Mental preparation

Proper mental preparation is the first step in the performance of FNAC. Most of the pain experienced by patients is minor discomfort magnified by anxiety. In the present study, all the patients were reassured as to the simplicity and painlessness of the procedure and the patient was asked not to swallow while the needle is in the nodule.

2. Physical examination

In the present study, patient was asked to rest in supine position with the head and neck extended over a pillow. The degree of extension should not produce skin tension that interferes with nodule palpation or partially obstructs vertebral artery blood flow in the elderly. The site of the needle puncture was cleaned by firm application of an alcohol swab.

3. Syringe

A 10 or 5mL syringe was used for obtaining cytologic specimens in the present study.

4. Needle

In the present study, 21 gauge needle was used.

5. Needle

For nodules 1.5 cm or smaller, to and from movements of the needle into the nodule was done. With larger nodules, peripheral subcapsular parts of the nodule were sampled rather than the center. Minimum of three passes were done in the present study. Whenever fluid was obtained all the contents were aspirated and centrifuged.

6. Smears

After aspiration, the needle is removed and the plunger is withdrawn. The needle is reattached, and the specimen is expressed onto the slide and then smeared with the edge of another slide. If particulate matter is visibly present then the material is compressed between two slides and smeared. In case of completely evacuated cystic nodule, smears were prepared from the sediment. The clean slides are then labelled and studied under light microscopy.

7. Number of Smears

Minimum of 4-5 smears were prepared in the present study.

8. Fixation and staining

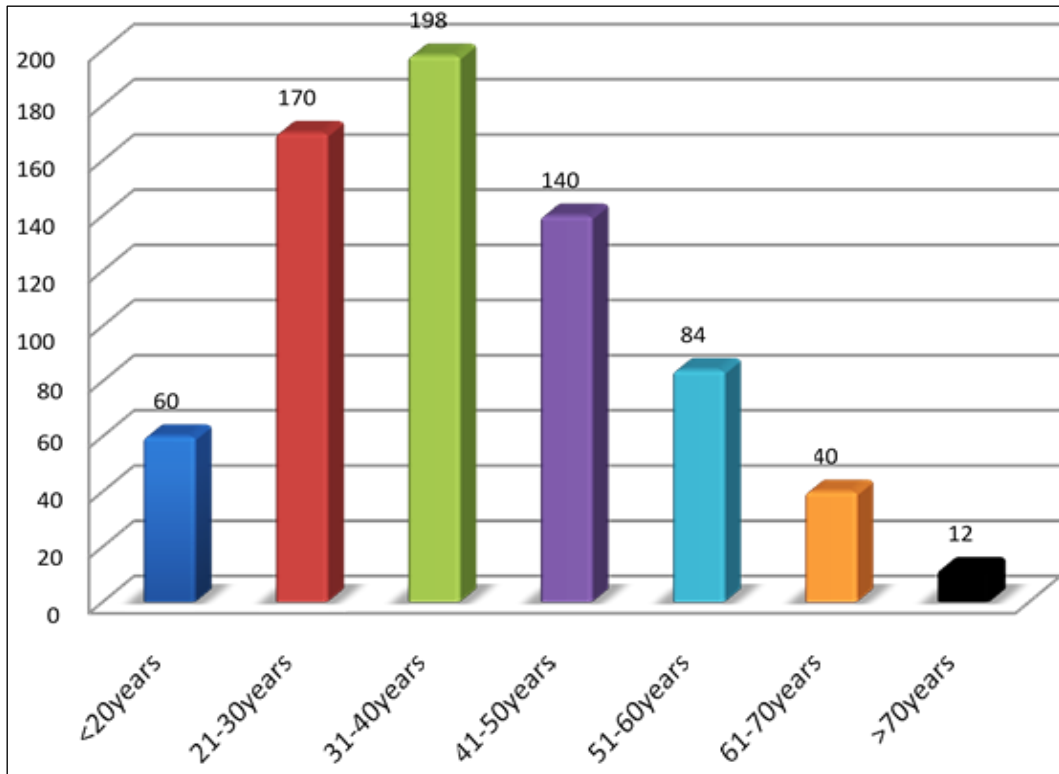
For Haematoxylin and eosin (H&E) and Papanicolaou (Pap) stain: 95% ethyl alcohol was used for fixation.

For Leishman stain slides were air dried.

Results**1. Age**

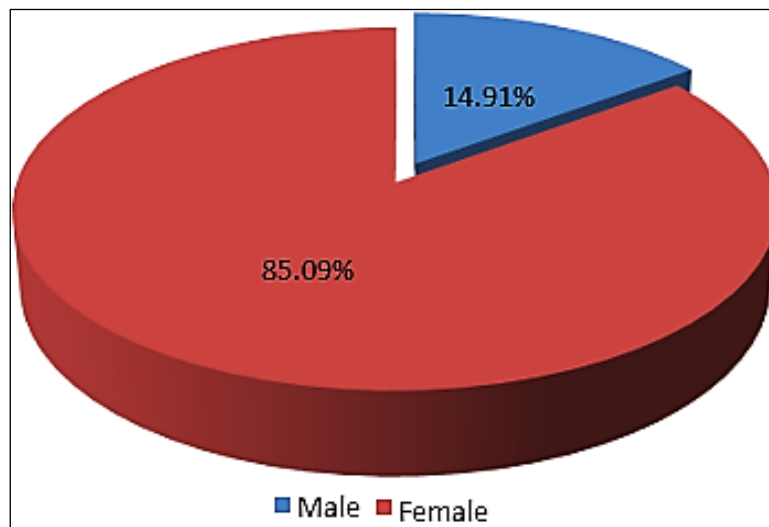
Table 1: Table showing age distribution of thyroid lesions in FNAC:

Age (years)	No of patients	%
<20	60	8.52
21-30	170	24.15
31-40	198	28.13
41-50	140	19.89
51-60	84	11.93
61-70	40	5.68
>70	12	1.70
Total	704	100



Graph 1: Graph showing age distribution of thyroid lesions in the present study

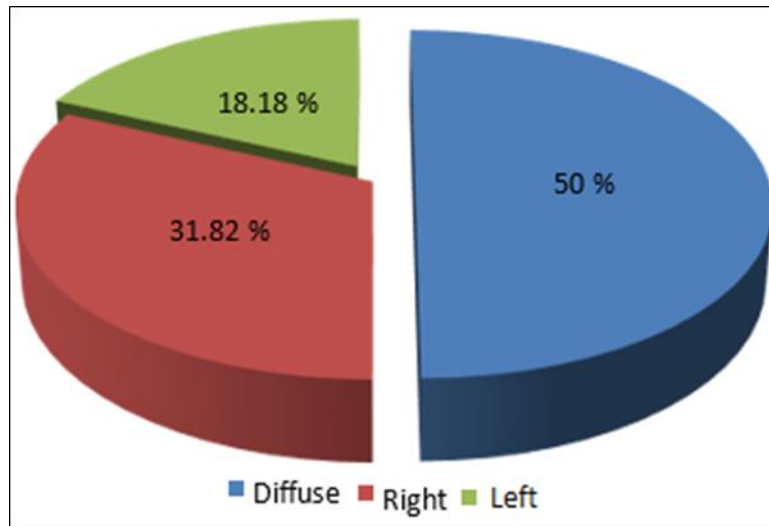
2. Sex



Graph 2: Graph showing sex distribution of thyroid lesions

3. Clinical presentation

Clinically thyroid swellings were divided into diffuse, right & left lobes.

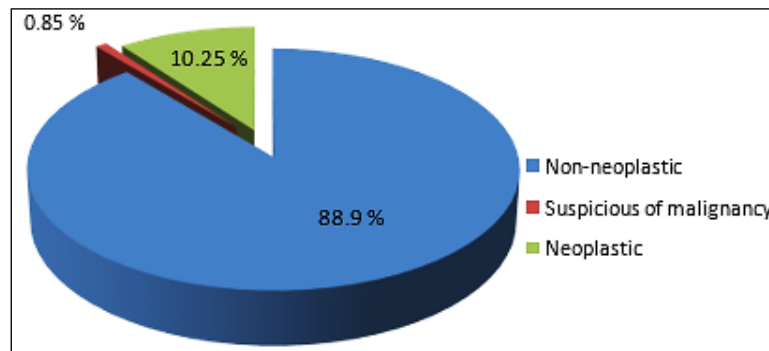


Graph 3: Graph showing lobe-wise distribution of thyroid swellings

4. Cytological diagnosis

Table 2: Table showing distribution of thyroid lesions by FNAC in each group

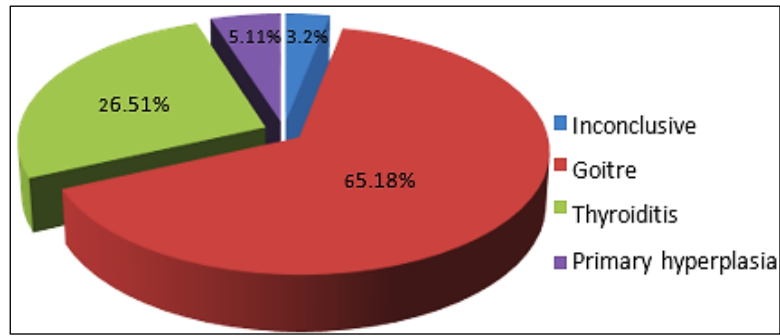
Lesions	No of patients	%
Non-neoplastic	626	88.9
Suspicious of malignancy	6	0.85
Neoplastic	72	10.25
Total	704	100



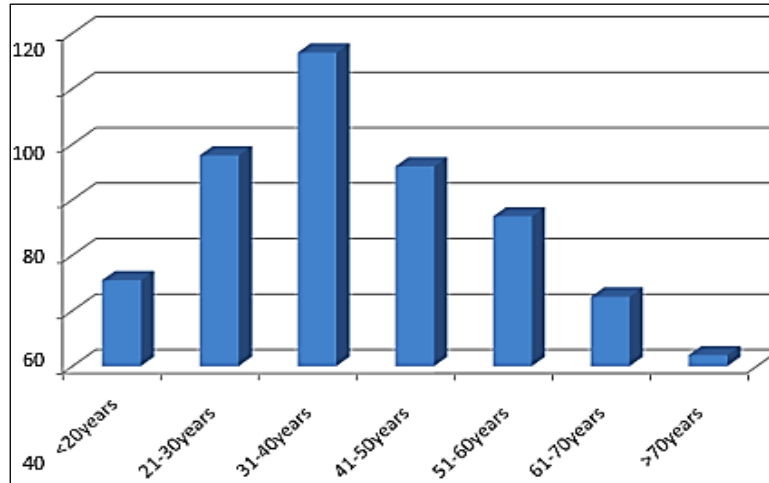
Graph 4: Graph showing distribution of thyroid lesions by FNAC in each group:

Table 4: Table showing distribution of non- neoplastic lesions on FNAC

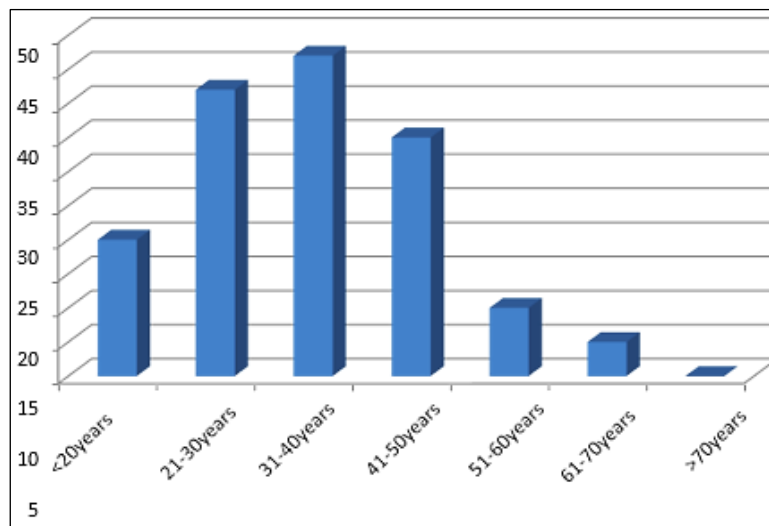
Lesions		No of patients	%
Inconclusive		20	3.20
Goitre	Colloid goitre	142	65.18
	Nodular goitre	149	
	MNG	84	
	Adenomatoid goitre	33	
Thyroiditis	Lymphocytic thyroiditis	4	26.51
	Hashimoto thyroiditis	159	
	De quatrain’s thyroiditis	3	
Primary hyperplasia		32	5.11
Total		626	100



Graph 5: Graph showing distribution of non- neoplastic lesions on FNAC:



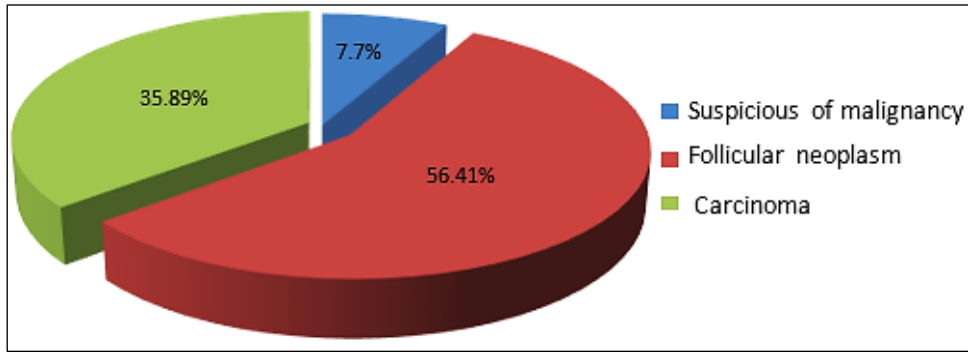
Graph 6: Graph showing age distribution of all goitre cases



Graph 7: Graph showing age distribution in Hashimoto's thyroiditis

Table 5: Table showing distribution of suspicious of malignancy and neoplastic lesions on FNAC

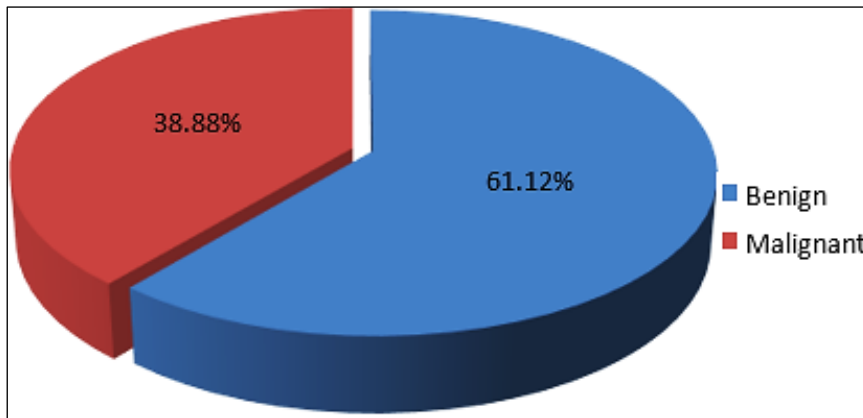
Lesions		No of patients	%
Suspicious of malignancy		6	7.7
Follicular neoplasm		44	56.41
Carcinoma	Papillary carcinoma	23	35.89
	Medullary carcinoma	3	
	Anaplastic carcinoma	1	
	Squamous cell carcinoma	1	
Total		78	100



Graph 8: Graph showing distribution of lesions in suspicious of malignancy and neoplastic lesions on FNAC

Table 6: Table showing distribution of cases under neoplastic lesions by FNAC

Lesions	No of patients	%
Benign	44	61.12
Malignant	28	38.88
Total	72	100

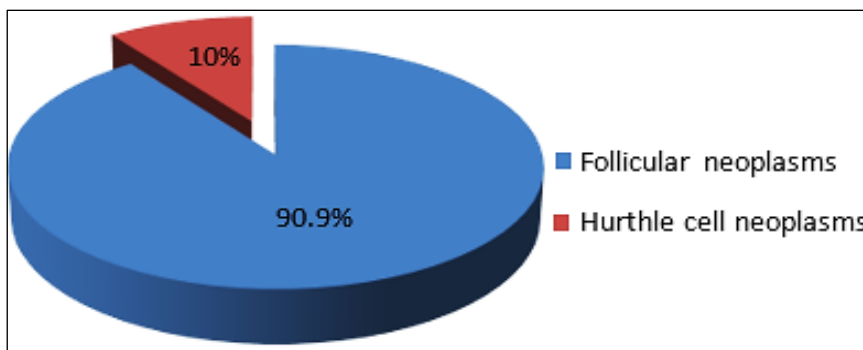


Graph 9: Graph showing distribution of cases under neoplastic lesions by FNAC

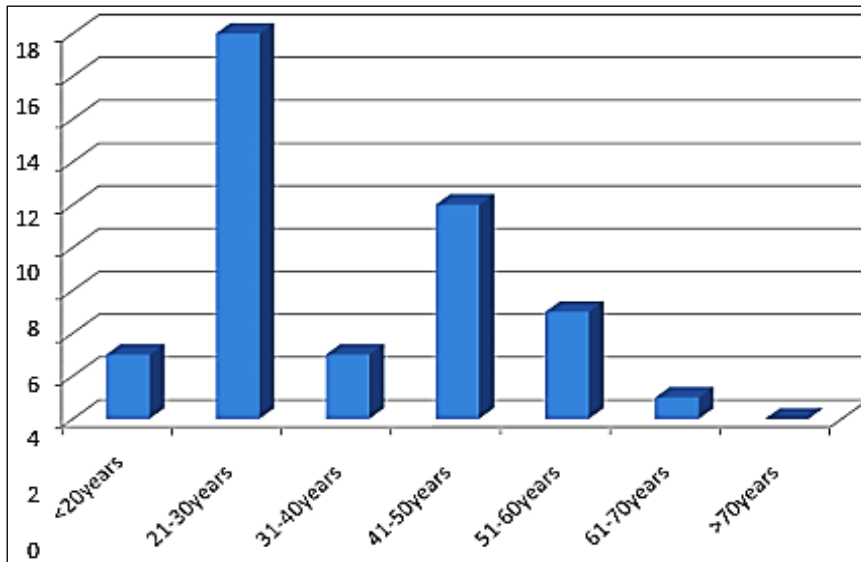
Benign lesions

Table 7: Table showing total number of benign lesions on FNAC

Lesions	No of patients	%
Follicular neoplasm	40	90.90
Hurthle cell neoplasm	4	10
Total	44	100



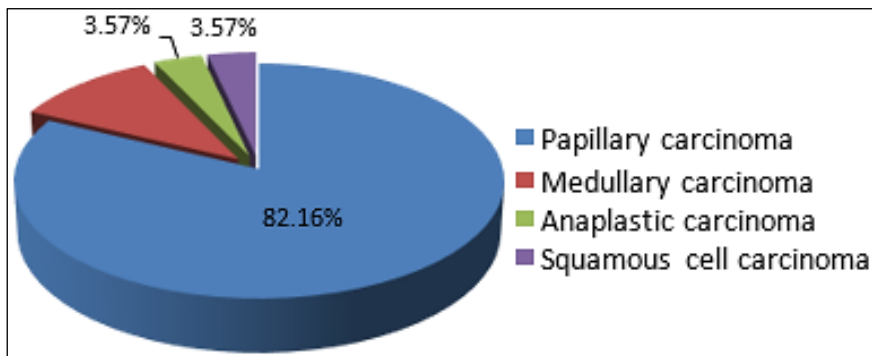
Graph 10: Graph showing total number of benign lesions on FNAC



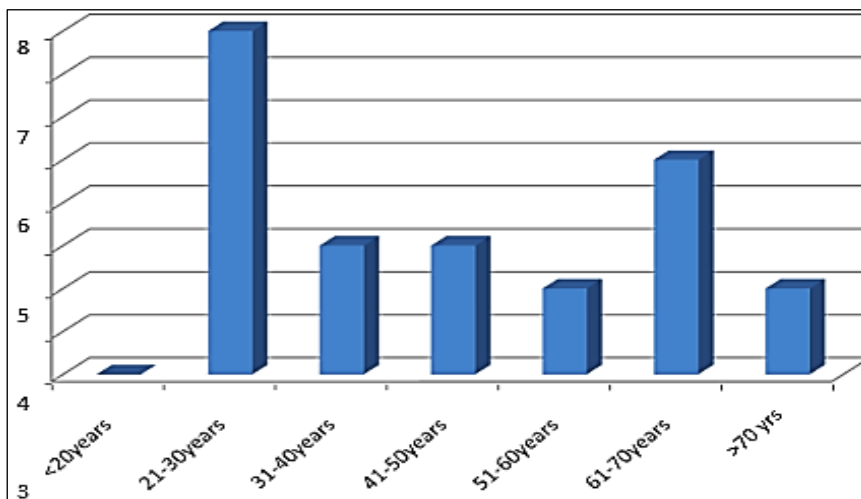
Graph 11: Graph showing age distribution in follicular neoplasm cases on FNAC

Table 8: Table showing distribution of malignant lesions on FNAC

Lesions	No of patients	%
Papillary carcinoma	23	82.16
Medullary carcinoma	3	10.7
Anaplastic carcinoma	1	3.57
Squamous cell carcinoma	1	3.57
Total	28	100



Graph 12: Graph showing distribution of cases under malignant lesions on FNAC



Graph 13: Graph showing age distribution of papillary carcinoma cases on FNAC

Discussion

In this study, patient's age ranged from 9-85 years with mean age of 38.72 years. Majority of patients were in the age group between 31-40 years i.e. 198 cases (28.13%) followed by 170 cases (24.15%) in the age group 21-30yrs and then 140 cases (19.89%) in the age group of 41-50yrs. Only few patients were in the age group of above 70yrs, i.e. 12 cases (1.70%). Majority of the patients were females accounting for 85.09% and males 14.91% with male: female ratio of 1:5.

In the present study, majority of patients presented with diffuse thyroid enlargement in 352 cases (50%) followed by right lobe 224 (31.82%) and least was left lobe 128 (18.18%).

In the present study, all FNACs performed in our institute were classified into the following thyroid lesions^[9].

We performed FNAC on 704 patients in five year duration and classified as follows:

1. Non-neoplastic lesions.
2. Suspicious of malignancy.
3. Neoplastic lesions.

In the present study, non-neoplastic lesions formed the major group i.e.626 cases (88.9%) followed by 72 cases (10.25%) of neoplastic lesions and six cases (0.85%) of suspicious of malignancy. Majority of cases belonged to goitre group 408 cases (65.18%) followed by thyroiditis 166 cases (26.51%) and then 32 cases (5.11%) of hyperplasia. Cases were diagnosed as inconclusive when only sparse follicular cells were seen on the smears or if it was only hemorrhage even on re- aspiration. Cases were diagnosed as colloid goitre when there was cystic swelling and aspirate yielded only colloid. Out of 142 cases of colloid goitre in our study, 98 cases were associated with cystic change and 2 cases were associated with secondary inflammation. Cases were diagnosed as nodular goitre when patient presented with solitary nodule and as multinodular goitre when it was multiple nodules as aided by ultrasonography. Out of 33 cases of adenomatoid goitre in our study, 3 cases were diagnosed as toxic goitre. In the present study, age and sex distribution of different non-neoplastic lesions were studied. Most of the patients were in the age group between 31-40 years i.e. 113 cases (30.13%) and least were in the age group of >70 years i.e. 4 cases (1.06%). Majority of patients were females comprising of 311 cases (82.96%) followed by 64 (17.04%) males.

Adenomatoid goitre

Most of the patients were in the age group between 31-40 years i.e. 9 cases (30%) and least were in the age group of 61-70 years i.e. 1 case (3.33%). Majority of patients were females comprising 26 cases (86.67%) followed by 4 (13.33%) males.

Toxic goitre

Out of 3 cases studied, one patient was 35 year old female who presented with left lobe swelling. Other two patients were 29 year old male and 35 year old female who presented with diffuse thyroid swelling respectively.

Lymphocytic thyroiditis

In the present study four cases of lymphocytic thyroiditis were seen. Clinically two patients were in the age group of 21-30 yrs, one patient between 31-40 yrs and one patient between 51-60 yrs. Two patients presented with diffuse swelling of the gland, one patient with enlarged right lobe and the other patient with enlarged left lobe. All were females.

Hashimoto's thyroiditis

Most of the patients were in the age group between 31-40 years i.e. 47 cases (29.55%) and least were in the age group of 61-70 years i.e. 5 cases (3.14%). Majority of patients were females comprising of 150 cases (94.33%) followed by 9 (5.67%) males.

De quatrains' thyroiditis

In the present study 3 cases of de quervain's thyroiditis were seen. Clinically, one patient was a 29 year old female who came with right lobe swelling. One was a 35 year old and the other was 42 year old, both of them presented with diffuse thyroid swelling.

Hyperplasia

There were 32 cases of hyperplasia studied in our study. Most of the patients were in the age group between 31-40 years i.e. 13 cases (40.62%) and least were in the age group of 61-70 years i.e. 1 case (3.12%). Majority of patients were females comprising of 26 cases (81.25%) followed by 6 (18.75%) males.

Present study included 6 cases were diagnosed as suspicious of malignancy and 72 cases as neoplastic lesions. In the present study, there were six cases of suspicious of papillary carcinoma. Clinically, youngest was 23 year old female and oldest was 73 year old female. Other two were 45 years old females and two were 55 year old and 60 year old respectively. Out of 72 neoplastic lesions, 44 cases (61.12%) were benign and 28 cases (38.88%) were malignant.

Follicular neoplasm

In the present study 40 cases of follicular neoplasm were seen. Most of the patients were in the age group between 41-50 years i.e. 10 cases (25%) and least were in the age group of 61-70 years i.e. 1 case (2.5%). Majority of patients were females comprising of 31 cases (77.5%) followed by 9 (22.5%) males.

Hurthle cell neoplasm

In the present study 4 cases of Hurthle neoplasm were seen. Clinically youngest was 17 year old female and oldest was 73 year old female. Other two were 25 year old female and 48 year old male.

In the present study 28 cases of carcinoma were seen which included 23 cases of papillary carcinoma, three cases of medullary carcinoma and one case each of anaplastic carcinoma and squamous cell carcinoma Among the malignant lesions, papillary carcinoma forms the major category of 23 cases (82.16%).

Papillary carcinoma

In the present study 23 cases of papillary carcinoma were seen. Most of the patients were in the age group between 21-30 years i.e. 8 cases (34.8%) and least were in the age group of 51-60 years and >70 years i.e. 2 cases each (8.71%). Majority of patients were females comprising of 18 cases (78.26%) followed by 5 (21.74%) males.

Medullary carcinoma

Three cases of medullary carcinoma were seen. Clinically, one was a 40 year old female who presented with left lobe swelling. Other was a 50 year old female who presented with right lobe swelling and the third was 56 year old female who presented with diffuse thyroid swelling.

Anaplastic carcinoma

One case of anaplastic carcinoma was seen i.e. 71 year old female patient with multiple nodules front of the neck.

Squamous cell carcinoma

Present study includes one case i.e. female aged 55 years with right lobe swelling.

Conclusion

Out of 704 cases of thyroid lesions, non-neoplastic lesions were 626 cases followed by 72 cases of neoplastic lesions and six cases of suspicious of malignancy. Of the non-neoplastic

lesions, 20 cases were inconclusive, 408 cases were goitre, 166 cases of thyroiditis and then 32 cases of hyperplasia. Of the 9 neoplastic lesions, 44 cases were benign and 28 cases were malignant. Out of the benign cases, 40 cases were follicular neoplasm and 4 cases of Hurthle cell neoplasm. Out of 28 cases of carcinoma, there were 23 cases of papillary carcinoma, three cases of medullary carcinoma and one case each of anaplastic carcinoma and squamous cell carcinoma.

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