Research Article

# Study of cytodiagnosis of thyroid neoplastic lesions and comparison with histopathology

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**Abstract**

**Background:** One of the major advancement in anatomic pathology is found to be the improvements in aspiration cytology. Cancer is found to be one among the 10 leading causes of mortality in India. The advantages of FNAC are: safety, quick results, sensitivity and specificity for the diagnosis of malignancy, less requirement of equipments, minimal discomfort caused to the patient, an outpatient procedure, nonuse of frozen sections, reduction in the rate of exploratory procedures, definitive diagnosis of inoperable cases, repeatable, and cost-effective. Fine needle aspiration cytology (FNAC) is of particular significance in thyroid lesions, because of easy accessibility; outstanding patient adherence; being a minimally invasive procedure; and aid in avoiding the surgery in nonneoplastic lesions, inflammatory conditions, and some tumors.

**Objective:** To test the utility of FNAC, establish the diagnostic accuracy of cytology by comparison with histopathology diagnosis, and establish the sensitivity and specificity of this technique in thyroid neoplastic lesion.

**Materials and Methods:** This study was undertaken in the Department of Pathology, Government Medical College and Hospital, Nashik, between January 2008 and June 2009. All cases were studied with initial clinical evaluation, followed by FNAC, and subsequent histopathology wherever needed.

**Result:** Of the total 84 cases of neoplastic thyroid lesions, 22 (26.19%) cases were malignant and 62 (73.81%) cases benign. Of the total 84 cases, 16 (19.05%) cases were male and 68 (80.95%) cases female subjects. The most common age group affected was found to be 51–60 years (23.81%). Of the total 84 aspirates, 20 (23.81%) cases were available for follow-up and histopathology examination. Of these 20 follow-up cases, cytological diagnosis and histopathological diagnosis were the same in 16 (80%) cases, whereas they were different in 4 (20%) cases.

**Conclusion:** Excisional biopsy remains the gold standard for the diagnosis of thyroid neoplastic lesion; cytological study can establish the diagnosis of the majority of thyroid neoplasm and can be recommended as an adjunct to histopathology.

**KEY WORDS:** Fine needle aspiration cytology, histopathological confirmation, thyroid neoplastic lesions

## Introduction

Cytopathology is defined as the study of cells that have exfoliated freely from tissue surfaces or that have been collected by brushing, scraping, washing, or needle aspiration. The method to procure cells and tissue fragments through a needle introduced into the abnormal tissue already existed. In the mid-nineteenth century, Kun (1847), Lambert (1851), and Mentrier (1886) employed needles to obtain cells and tissue fragments to diagnose cancer.

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Fine needle aspiration of the thyroid has been utilized as a diagnostic method for 40 years. This method introduced by Söderström in 1952 has been extensively used in Sweden and shown to be both dependable and accurate.[1] Fine needle aspiration cytology (FNAC) of thyroid for cytological diagnosis of thyroid diseases was first reported by Martin and Ellis of Memorial Hospital for Cancer and Allied Diseases,

New York, in 1930. Early recognition and categorization of the diseases are mandatory if an increased number of cures are to be achieved.[2]

Cancer is found to be one among the 10 leading causes of mortality in India. Head and neck neoplasia including thyroid neoplasms are a major form of cancer in India with 23% prevalence of all cancers in male and 6% in female subjects.[3,4] FNAC plays a significant role in the thyroid region owing to the easy accessibility of target sites. FNAC in this region is easy, because of outstanding patient adherence; being a minimally invasive procedure; and aid in avoiding the surgery in situations such as nonneoplastic lesions, inflammatory conditions, and metastatic tumors.

Lesions of thyroid comprise inflammatory, infective, vascular, cystic, benign or malignant neoplasm or a metastatic tumor. Thyroid-neoplastic lesions commonly reported on cytology are follicular neoplasm, papillary carcinoma, anaplastic carcinoma, medullary carcinoma, and lymphoma.[5] The FNAC has an accuracy rate exceeding 92%.

The advantages of FNAC are safety, quick results, sensitivity and specificity for the diagnosis of malignancy, less requirement of equipments, minimal discomfort caused to the patient, outpatient procedure, reduction in bed occupancy, preoperative diagnosis, nonuse of frozen sections, reduction in the rate of exploratory procedures, definitive diagnosis of inoperable cases, repeatable, and cost effective. The association of cytological diagnosis and histopathological findings in the surgical specimen helps the pathologist's cytological interpretation to be at-ease.[6] Stewart's opinion of the technique is still valid today as it was in 1933, when he stated "diagnosis by aspiration is as reliable as the combined intelligence of the clinicians and pathologists makes it."

Many times, we find that some of the cytopathological reports are not consistent with the final histopathological reports. So, this study was done to find out the sensitivity of cytopathological reports of thyroid neoplastic lesions with histopathological findings and test the efficacy and overall utility of cytology in the thyroid neoplastic lesions.

## Materials and Methods

This study was undertaken in the Department of Pathology, Government Medical College and Hospital, Nashik, Maharashtra, India, between January 2008 and June 2009. Approval from the institutional ethical committee and from ethical committee of Maharashtra University of Health Sciences (MUHS), Nashik, was taken before commencing the study.

The patients presented with superficially palpable thyroid lesion, patient admitted in hospital ward of this institute with clinical diagnosis of any thyroid neoplastic lesions, and patients attending cytological OPD in a private laboratory with thyroid lesion were selected for this study.

FNAC was done in the cytology section of central clinical laboratory or in the respective ward in which the patient was admitted. The method of FNAC used in this study is same as described by Franzen et al. Aspiration was carried out using 20-mL disposable syringe with 23-25 gauze needle attached to Franzen's aspiration handle. Two or three wet smears were prepared following the guidelines laid down in the manual and atlas of FNAC.[7,8] Then, they were fixed in 95% ethyl alcohol and others were air dried and routinely stained with Papanicalaou (PAP)/hemotoxylin and eosin (H&E) stains.

The received postoperative surgical specimen were fixed in 10% neutral formalin and subjected to gross examination, processing, paraffin embedding, section cutting, staining by H&E, and mounting by DPX. The cytomorphological features of various diseases were studied. FNAC and histopathological examination of the same lesions were correlated where available.

Of the total 84 cases of neoplastic thyroid lesions, 22 (26.19%) cases were malignant and 62 (73.81%) cases benign. Of the total 84 cases with neoplastic thyroid lesions, 16 (19.05%) cases were male and 68 (80.95%) female subjects. The female subjects were more commonly affected. The female to male ratio was 4.25:1. The most common neoplastic lesion of the thyroid on cytologic diagnosis was found to be follicular neoplasm (73.81%), followed by papillary carcinoma of thyroid (9.52%), and then by medullary and anaplastic carcinomas of thyroid (4.76% each).

The most common age group affected was found to be 51–60 years (23.81%), and papillary carcinoma was found most commonly in the age group of 31–40 years (50%). No case was observed in the age group of 0–10 years. The mean age group for thyroid neoplastic lesion in this study was 41.43 years.

## Result

In this study, a total of 84 aspirates from thyroid neoplasms were studied for cytopathological examination and correlated with histopathology findings where needed.

Many cases of thyroid neoplasms were selected for cytohistological correlation. In this study, of the total 84 aspirates, 20 (23.81%) cases were available for follow-up and histopathology diagnosis. Of these 20 follow-up cases, the cytological and histopathological diagnoses were the same in 16 (80%) cases, whereas they were different in 4 (20.0%) cases. Of these 20 follow-up cases, 10 cases were diagnosed as follicular neoplasm, 4 cases papillary carcinoma, 2 cases medullary carcinoma, and 4 cases suspicious of malignancy on cytopathological examination. Of these 20 follow-up cases, 16 cases were consistent and 4 cases inconsistent with the cytological diagnosis. Of these 4 cases that were not consistent with cytopathological diagnosis, 2 cases were found to be of papillary carcinoma and other 2 cases of anaplastic carcinoma.

In this study, follicular neoplasm is the most common in the 41–50 years age group (25.80%), followed by 51–60 years age group (22.58%). The mean age was found to be 41.43 years.

## Discussion

This study was carried out in the Department of Pathology, Government Medical College and Hospital, Nashik, India, from January 2008 to June 2009. A total of 84 aspirates of thyroid neoplastic lesions were studied to test the efficacy and overall utility of cytology in the thyroid neoplastic lesions. Detailed clinical, cytopathology, and histopathology examinations in the available cases were done to reach the definitive diagnosis. In this study, the majority of thyroid neoplastic lesions were found to be follicular neoplasm, followed by papillary carcinoma thyroid. Of these 20 follow-up cases, only in 4 (20.%) cases, the cytologic diagnosis and final histopathological diagnosis were different. Of these 4 cases, 2 cases were found to be of papillary carcinoma and other 02 cases of anaplastic carcinoma. The female subjects were more commonly affected. The female to male ratio was 4.25:1. The mean age was found to be 41.43 years.

In the study by Suen and Quenville et al.,[9] in 1983, of the total cases, 57.77% were of follicular neoplasm; 23.94% of papillary, medullary and anaplastic carcinomas; and 18.30% suspicious of malignancy. In the study by Bhaskaran et al.,[10] in 1990, of the total cases, 71.04% were of follicular neoplasm, 19.82% of papillary, medullary, and anaplastic carcinomas, 9.14% suspicious of malignancy. In the study by Mandreker et al.,[11] in 1995, of the total cases, 83.42% were of follicular neoplasm, 12.15% of papillarycarcinoma, and 4.42% of other malignancy. In the study by Sirpal,[12] in 1996, of the total cases, 53.33% were of follicular neoplasm, 30.0% of papillary carcinoma, 16.67% of other malignancy. In the study by Dorairajan and Jayashree,[13] in 1996, of the total cases, 82.09% were of follicular neoplasm, 16.42% of papillary carcinoma, and 1.49% of other malignancy. In the studyby Jayaram and Dashini,[14] in 1999, of the total cases, 62.16% were of follicular neoplasm, 19.82% of papillary carcinoma, an d18.08% of other malignancy. In the study by Zeppa et al.,[15] in 2001, of the total cases, 63.50% were of follicular neoplasm, 20.26% of papillary carcinoma, and 16.24% of other malignancy. In the study by Mitra et al.,[16] in 2002, of the total cases, 66.67% were of follicular neoplasm, 23.80% of papillary carcinoma, and 7.13% of other malignancy. In the study by Yang et al.,[17] in 2007, of the total cases, 52.97% were of follicular neoplasm, 34.96% of papillary, medullary, and anaplastic carcinomas, and 12.07% suspicious of malignancy. In this study, of the total cases, 73.81% were of follicular neoplasm, 9.52% each of papillary carcinoma and other malignancy, and 7.14% suspicious of malignancy.

In the study by Piromalli et al.,[18] the mean age was 46 years and female to male ratio 6.2:1. In the study by Sirpal.,[12] the mean age was 35.03 years and female to male ratio 4.5:1. In the study by Yang et al.,[17] the mean age was 49.60 years and female to male ratio 5.4:1. In the study by Handa et al.,[19] the mean age was 37.69 years and female to male ratio was 6.3:1. In this study, the mean age was 41.43 years and female to male ratio was 4.25:1, which is comparable with other studies.

Of the total 84 cases of thyroid neoplastic lesions, 20 cases were available for histopathological confirmation. Ten cases reported as follicular neoplasm on cytology were available for histopathology diagnosis: 6 cases diagnosed as follicular adenoma and 4 cases diagnosed as follicular carcinoma. Four cases were reported as suspicious for malignancy on cytology findings; 2 cases were diagnosed as papillary carcinoma of the thyroid; 2 diagnosed as anaplastic carcinoma of thyroid; and 2diagnosed as medullary carcinoma thyroid was confirmed histopathologically. Suen and Quenville[9] reported 14 suspected thyroid lesions of which 7 were papillary carcinoma thyroid. Dorairajan and Jayashree et al.[13] reported eight cases as suspicious lesions on cytology examination. On histopathology diagnosis, seven were confirmed as malignant. Segev et al.[20] stated that 10%–15% cases of thyroid lesions were indeterminate or suspicious. The study by de la Saravia et al.,[21] reported that indeterminate category rate was 4.4% in the total series. All cases were clinically solitary nodule with a predominance of papillary carcinoma and follicular carcinoma on histopathology diagnosis. Yang et al.,[17] in their series reported 84 cases as suspicious for papillary carcinoma of thyroid, of which 63 cases were confirmed on histopathology diagnosis.

## Conclusion

We recommend that FNAC to be a safe and reliable technique in the diagnosis of thyroid neoplastic lesions. It is a quick, convenient, and an accurate method of tissue diagnosis and should be considered as the first-line investigation in the evaluation of lesions in head and neck regions. This cytological study of head and neck neoplastic lesions showed that FNAC is a simple, rapid, safe, atraumatic procedure, free of complications, cost-effective, virtually painless, well-tolerated by the patient including the pediatric population, and performed on an outpatient basis. It is useful in the diagnosis of various thyroid neoplastic lesions, can be used as a screening procedure to decide further mode of management, is extremely useful in debilitated, old patients in whom biopsy is not desirable, is also a useful diagnostic procedure for follow-up cases, and aids in the simultaneous study of recurrences and multiple lesions. Thus, to conclude, while excisional biopsy remains the gold standard for the diagnosis of thyroid neoplastic lesion, cytological study can establish the diagnosis of the majority of thyroid neoplastic lesions and can be recommended as an adjunct HPE.

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