



## FNAC: a preoperative diagnostic tool for solitary thyroid nodule

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### ABSTRACT

Clinically, solitary thyroid nodules are common. The majority are benign and thyroid cancer represents as an uncommon clinical problem. Fine needle aspiration cytology (FNAC) provides a valuable idea about the nature of thyroid tumours. It excludes most of the malignancies before any other investigations. An attempt was made to determine the accuracy of fine needle aspiration cytology (FNAC) in the diagnosis of solitary thyroid nodule and to avoid unnecessary surgery. This is a prospective analytical study conducted in the Department of Surgery & Department of ENT, V.S.S Medical College & Hospital, Burla, Sambalpur from November 2011 to October 2012 (one year) taking 210 OPD patients and 33 indoor patients. Out of 33 cases, FNAC showed 26 cases as benign and 7 cases as malignant lesions, while histopathological examination revealed 25 benign and 8 malignant lesions. FNAC was able to correctly pick 23 benign lesions, while 3 cases of benign lesions turned out to be malignant on histopathology (False negative). Out of total 8 cases which turned out to be malignant on histopathology, FNAC was able to pick 5 cases, while 2 benign lesions were misdiagnosed as malignant (false positive). The analysis of study showed a sensitivity of 62.5% and specificity 92% (p value=0.001) of FNAC in detecting malignancy in solitary thyroid nodule. This study reveals that FNAC is highly effective in detecting thyroid malignancy in solitary thyroid nodule with a high specificity (92%) and a relatively low sensitivity (62.5%) in our study.

### INTRODUCTION

Thyroid swelling has become a major health problem all over the world. The incidence of thyroid cancer has been steadily increasing over the past two decades. The incidence of thyroid nodules is significantly greater than the incidence of thyroid malignancy. Wienke JR has reported the prevalence of thyroid nodules about 47%. [1] Although most of these nodules are benign, the incidence of malignancy among them is 5% in postoperative histopathological study. This 5% of cases put a challenge for accurate preoperative diagnosis to avoid unnecessary surgeries and to avoid morbidities. Thyroid tumours are more prevalent in females and papillary carcinoma is the most common histological type of thyroid tumours followed by follicular carcinoma, medullary carcinoma, anaplastic carcinoma, non Hodgkin's lymphoma and unclassified tumours in order of frequency. [2] Males are more prone for malignancy.

A cost effective definitive preoperative diagnostic tool is essential to rule out malignancy from solitary thyroid nodule. If

definitively positive for malignancy by FNAC, treatment planning, which often includes surgical resections, is greatly assisted. FNAC is the cornerstone of the investigation [3], and it is the diagnostic procedure for the nodule after primary thyroid disease is ruled out with normal thyroid function test. [4] FNAC can be done under image guidance like ultra sonogram (USG). This image guided FNAC helps in proper placement of needle in deeper lesions as well as for evaluation of overall characters of the lesion.

FNAC is easily performed, accepted by the patients and has low cost benefit ratio. If the sample is not diagnostic, it can be easily repeated. Moreover, FNAC is also safe and highly accurate in the evaluation of thyroid nodules in childhood. [5]

### MATERIAL AND METHODS

This is a prospective analytical study. This study was conducted in the Department of Surgery and Department of ENT, V.S.S Medical College & Hospital, Burla, Sambalpur which is a

tertiary health care 1024 bedded hospital. Study period was from November 2011 to October 2012 (one year). The study included 210 OPD patients and 33 indoor patients. Patients admitted through outpatient department. Both sexes and all ages were included. Patients having multi nodular or diffuse thyroid & patients having associated medical illness e.g. hypertension, hepatic or renal failure were excluded from study.

All patients presented to ENT and surgery OPD with thyroid swellings were properly scrutinised for STN and FNAC was done with proper counselling to the patient. Local anaesthesia is hardly ever required when 22- 25 gauge needles are used. After sterilising the skin surface over the swelling, the mass was fixed & the needle with a 20cc syringe was introduced into the mass. The plunger was pulled to apply negative pressure; needle was moved back and forth within target tissue. Negative pressure was released, needle withdrawn and needle was detached, and air was drawn into the syringe. Both air dried and wet slides with 95% alcohol were made. Then slides were immersed in alcohol solution & were studied according to the guidelines of Papanicolou society. According to FNAC reports, patients were admitted for surgical interventions. The post operative specimen was sent for histopathological study and both FNAC & HPS reports were statistically analysed for sensitivity, specificity, positive predictive value, negative predictive value, false positive rate, and false negative rate. Comparison was done in 2x2 tables.

## RESULTS

Out of 210 OPD patients, there were 160 females and 60 males. Age range was 15 to 70 years and most of patients belonged to 15-45 years age group.

Painless swelling in the neck was the most common presentation (80%). Also patients complained of cosmetic results and cancer phobia as illustrated in table no-1. Most of the swellings (83%) were present in the right lobe. FNAC results of 210 OPD patients were illustrated in table no-2. Out of above 210 patients, 33 patients (15.7%) underwent surgery. On histopathology (table-3), majority were colloid goitre (60.6%) and papillary carcinoma (18%) was the most common among the malignant lesion.

The malignant lesion of histopathological report is considered as true positive cases. Keeping this as a standard, the FNAC report was analysed. So 3 cases were false negative & 2 cases were false positive cases (table-4). Table-5 summarises all the statistical analysis of FNAC & HPS. The sensitivity & specificity of our study were 62.5% & 92% respectively.

It is important to calculate the statistical significance of FNAC as a preoperative diagnostic tool for STN. This was done in 2x2 tables for p-value (table-6). The p-value was 0.001 which is highly significant.

## DISCUSSION

FNAC is the best and most reliable diagnostic tool for use in the preoperative management of patients with such lesions. [6] This study was carried out to evaluate the usefulness of FNAC in detecting malignancy in solitary thyroid nodule. Females are more prone for thyroid lesions. Maximum patients are in the age range of 15-45 years.

In FNAC, 70.47% cases are having colloid goitre which correlates with other studies. Nodular goitre was the most common finding among the benign lesions (51.21%) which agrees with studies of Gupta revealed 39 cases (52%) [7] as

**Table 1.** (Symptoms of STN) n=210

Presenting complaints	Number of patients	Percentage
Painless swelling & cosmetic problems	170	80.95%
Cancer phobia	30	14.28%
Swelling with obstructive symptoms	2	0.95%
Symptoms of hypothyroidism	8	3.8%

**Table 2.** (FNAC results) n=210

FNAC results	Number of patients	Percentage
Colloid goitre	148	70.47%
Autoimmune thyroiditis	42	20%
Follicular neoplasm	9	4.2%
Papillary carcinoma of thyroid	4	1.9%
Medullary carcinoma of thyroid	1	0.47%
Anaplastic carcinoma of thyroid	1	0.47%
Colloid cyst	4	1.9%
Hurthle cell carcinoma	1	0.47%

**Table 3.** (histopathological reports of post operative specimens) n=33

FNAC results	Number of patients	Percentage
Colloid goitre	20	60.6%
Follicular adenoma	3	9.09%
Hurthle cell adenoma	1	3.33%
Colloid cyst	1	3.33%
Papillary carcinoma of thyroid	6	18.18%
Follicular carcinoma	2	6.06%

colloid nodular goitre and Saddingue. [8] HPS in our study revealed 24.2% case malignant & 75.7% cases as benign. Mehmood in his study found non neoplastic lesions 79.49% and neoplastic lesions 20.51% cases in histopathology [9]. Musani et

**Table 4.** Interpretation errors of FNAC

FNAC diagnosis	Histopathological diagnosis	Interpretation
Colloid goitre	Papillary carcinoma of thyroid	False negative
Follicular lesion	Follicular carcinoma	False negative
Colloid goitre	Follicular variety of Papillary carcinoma of thyroid	False negative
Medullary carcinoma of thyroid	Colloid goitre	False positive
Hurthle cell carcinoma	Hurthle cell adenoma	False positive

**Table 5.** (statistical analysis of results) n=33

<b>Sensitivity</b>	62.5%
<b>Specificity</b>	92%
<b>Positive predictive value</b>	71.4%
<b>Negative predictive value</b>	88.4%
<b>False positive rate</b>	8%
<b>False negative rate</b>	37%
<b>Percentage of carcinoma</b>	15%

**Table 5.** Statistical significance via p-value calculation

	Malignant (disease)	Benign (not disease)
FNAC positive	5 (true positive)	2 (false positive)
FNAC negative	3 (false negative)	23 (true negative)

(p- Value=0.001; Chi square test-10.6)

al in 2008 found 12.4% cases out of 105 as malignant in biopsy.[10]

Three benign cases of FNAC turned to be malignant in HPS

which we have described as false negative. Similarly, two cases of FNAC as malignant came benign in HPS which is interpreted as false positive. False negative values arise from inadequate sampling; geographic misses of lesion, dual pathology and errors in interpretation.

The sensitivity & specificity of our study were 62.5% & 92% respectively. In a study compared conducted by T Aravinthan, sensitivity was 80.2% and specificity was 97.2%. [12]. Similarly Abu-Salem studied specificity of 99% and a sensitivity of 93%. [11] Tariq reported sensitivity 75%, specificity 97.6%. [12] The sensitivity of our study is very less with respect to above mentioned studies. This may be due to inter observer variation. Image guided FNAC gives better statistical value than conventional FNAC.

FNAC carries various advantages over other diagnostic procedures. Procedure is simple, little equipment & experience is needed. Only few cases required 2<sup>nd</sup> attempt. Complications like excessive bleeding and hematoma, recurrent laryngeal nerve palsy are not found. The procedure is time saving and cost effective. No difficulty encountered in obtaining their consent. The procedure is well accepted because it does not require any hospitalization or any psychological trauma. It can be done in patients unfit for surgery. It plays a great role in differentiating a recurrent carcinoma from inflammation, post operative hematoma and foreign body granuloma.

## CONCLUSION

FNAC has become a cornerstone as a preoperative diagnostic tool to diagnose a case of STN and differentiating benign and malignant lesions of thyroid to avoid unnecessary thyroid surgery. It is a cost effective and simple procedure which adds to its effectiveness. However, a close correlation is essential between clinicians and pathologists.

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