

# Comparative Study Of FNAC And Histopathology In The Diagnosis Of Thyroid Swelling

N R, B V, T G

## Citation

N R, B V, T G. *Comparative Study Of FNAC And Histopathology In The Diagnosis Of Thyroid Swelling*. The Internet Journal of Head and Neck Surgery. 2012 Volume 5 Number 2.

## Abstract

**Objective:** The aim of this study was to determine the accuracy of Fine needle aspiration cytology in detection of thyroid swellings in our ENT unit and to assess the correlation between preoperative cytodiagnosis and postoperative histopathological diagnosis. **Study design:** Cross sectional study **Place & Duration of study:** Department of ENT- Head & Neck Surgery, Charak hospital, Pokhara, Nepal, from January 2010 to December 2010. **Method:** Fifty patients with enlarged thyroid gland, of both sexes were selected. All patients had preoperative fine needle aspiration (FNAC), performed by pathologist at histopathology department and postoperative specimens were also examined after which histopathological diagnosis were made. All FNAC reports were correlated with histopathology diagnosis. **Results:** Out of 50 patients 46 were female and 4 male. FNAC was accurate in 94% patients. Over all sensitivity was 91.66% and specificity of 97.29%. **Conclusions:** FNAC is reliable, safe and accurate method as a first line of evaluation in thyroid gland nodules before surgery. FNAC is more specific than sensitive in detecting thyroid gland malignancy and therefore histopathological analysis still remains essential for the final diagnosis.

## INTRODUCTION

Nodular goiter remains a problem of enormous magnitude all over the world. The problem in clinical practice is to distinguish reliably the few malignant tumours from the many harmless nodules so that a definitive pre-operative tissue diagnosis of malignancy allows planning of appropriate surgery and relevant patient counselling.

Fine needle aspiration cytology (FNAC) is simple, less expensive, readily available and reliable, time saving, easy to perform, effective and almost accurate diagnostic technique for investigation of thyroid swelling. The prevalence of thyroid swelling ranges from 4% to 10% in the general adult population and from 0.2% to 1.2% in children<sup>1</sup>. The majority of clinically diagnosed thyroid swelling are nonneoplastic; only 5%–30% are malignant and require surgical intervention<sup>2</sup>.

Histological examination of the removed thyroid swelling is the most accurate way to determine the pathology. It requires preparation and long procedure like anaesthesia, hospitalization and sometime even over treatment (Thomas V, 2000).

Laboratory investigations other than FNAC have limited role to find out the nature of thyroid swelling. Isotope scan can

demonstrate the functioning capacity of the nodule but cannot predict the histopathological character (Satter MA, 2003). Ultrasonographic scanning is capable of differentiating solid from cystic lesion but cannot distinguish malignant from benign one (Pendse A.K, 1983).

The main stem of diagnosis of nodular thyroid swelling is by clinical means, fine needle aspiration cytology and histopathological (histopathology) examination. But they differ in many occasions and therefore this comparison is done with a view to make the correlation between FNAC and histopathology. Previous studies shows that the sensitivity of thyroid FNAC ranges from 80 to 98 percent and its specificity from 58 to 100% (Bajaj Y, 2006).<sup>92</sup>.

## METHODS

A Cross sectional study was done in the Department of ENT- Head & Neck Surgery, Charak hospital, Pokhara, Nepal, from January 2010 to December 2010. All patients were evaluated by thorough clinical examination followed by routine investigations, thyroid function tests, FNAC and histopathological examination. The cytology reports were compared with the histological diagnoses. Sensitivity, specificity, accuracy, positive predictive value, and negative predictive value were calculated.

**INCLUSION CRITERIA**

Those patients presenting with thyroid swelling who underwent FNAC ,thyroid surgery and histopathological examination.

**EXCLUSION CRITERIA**

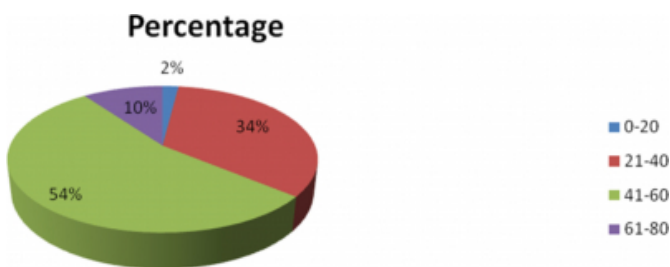
All the cases of thyrioditis were excluded.

Those patients having FNAC done but didnot had thyroid surgery were excluded.

**RESULTS**

**Figure 1**

Figure 1: Age distribution of thyroid swelling



Patient with age group 0-20 ; 21-40 ; 41-60 and 61-80 years were 2% ; 34% ; 54% and 10% respectively. Most of the patients were between the age 41-60 years.

**Figure 2**

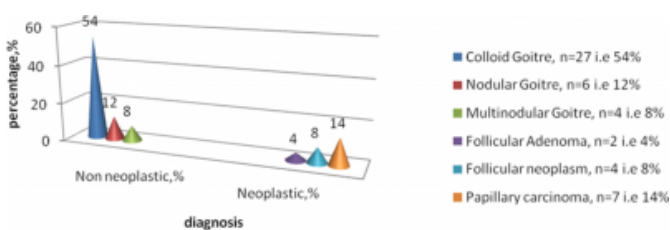
Table 1: Sex distribution of thyroid swelling

	No. of patient	Percent, %
Male	4	8
Female	46	92
Total (n)	50	100

Female were higher in frequency ( n=46 ; 92% ) than men ( n=4 ; 8% ).

**Figure 3**

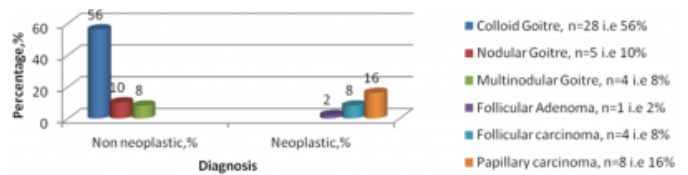
Figure 2: FNAC diagnosis of thyroid swelling (n=50)



In this series of 50 thyroid swelling, on FNAC shows thirty seven (74%) non neoplastic and thirteen(26%) neoplastic. Among non neoplastic thyroid swelling, colloid goitre was common twenty seven (54%), followed by nodular goitre which was six (12%) and multinodular goitre four cases (8%). Among neoplastic thyroid swelling Papillary carcinoma was the most common seven (14%) followed by Follicular neoplasm four (8%). There were two cases of Follicular Adenoma.

**Figure 4**

Figure 3: Histopathological diagnosis of thyroid swelling (n=50)



Out of fifty cases of thyroid swelling after histopathology thirty seven (74%) were non neoplastic and thirteen (26%) were neoplastic. Among thirty seven cases of non neoplastic thyroid swelling colloid goiter was twenty eight (56%) followed by nodular goiter five (10%) and multinodular goitre four (8%). Among neoplastic thyroid swelling Papillary carcinoma was the most common. eight (16%) followed by Follicular carcinoma four (8%). There was one case of Follicular Adenoma.

**Figure 5**

Table 2: Variation of diagnosis between FNAC and histopathology in thyroid swelling (n=50)

Diagnosis	FNAC	Histopathology
Nonneoplastic:		
Colloid Goiter	27	28
NG	6	5
MNG	4	4
Neoplastic :		
Follicular Adenoma	2	1
F.Neoplasm	4	-
F. Ca	-	4
P. Ca	7	8
Total(n) =	50	50

One case of Nodular goitre in FNAC was diagnosed as Papillary carcinoma in histopathological examination and one case of Follicular neoplasm in FNAC was diagnosed as Colloid goitre in histopathological examination. Out of 50 cases 27 diagnosed as colloid goitre, 5 cases of nodular goitre, 4 cases of multinodular goitre 1 case of Follicular adenoma, 4 cases of follicular neoplasm and 7 cases of Papillary carcinoma were also found to be of similar diagnosis in histopathological examination in the same number.

**Figure 6**

Table 3: The accuracy of diagnostic test of FNAC in thyroid swelling

Test (FNAC)	Malignant in histopath.	Benign in histopath.
Positive test	True positive (TP) 11	False positive (FP) 1
Negative test	False negative (FN) 1	True negative (TN) 36

True positive: Those with positive results on histopathology and on FNAC, who actually have the disease.

False negative: Those with negative result on FNAC but positive on histopathology, who actually have the disease.

Sensitivity: This is the portion of the patients having malignant thyroid disease and positive cytological diagnosis on FNAC.

**Figure 7**

$$\begin{aligned} \text{Sensitivity} &= \text{TP} / \text{TP} + \text{FN} \times 100 \\ &= 11 / 11 + 1 \times 100 \\ &= 91.66 \% \end{aligned}$$

True negative: Those with non malignant thyroid disease on FNAC, who do not actually have the malignant disease on histopathology.

False positive: Those with positive for malignant thyroid disease on FNAC, who do not actually have the malignant disease on histopathology.

Specificity: The portion of the patients with non malignant thyroid disease and positive cytological diagnosis calculated by:

**Figure 8**

$$\begin{aligned} \text{Specificity} &= \text{TN} / \text{TN} + \text{FP} \times 100 \\ &= 36 / 36 + 1 \times 100 \\ &= 97.29 \% \end{aligned}$$

Accuracy: The proportion of the correct results true positive and true negative in relation to all cases studied, calculated by:

**Figure 9**

$$\begin{aligned} \text{Accuracy} &= \text{TP} + \text{TN} / \text{Total No} \times 100 \\ &= 11 + 36 / 50 \times 100 \\ &= 94 \% \end{aligned}$$

Positive Predictive Value (PPV): This is the probability of having malignant thyroid disease following a positive FNAC finding and is calculated by:

**Figure 10**

PPV(%) =	$\begin{aligned} &\text{TP} / \text{TP} + \text{FP} \times 100 \\ &= 11 / 11 + 1 \times 100 \\ &= 91.66 \% \end{aligned}$
----------	---

Negative Predictive Value (NPV): This is the probability of not having malignant thyroid disease following negative FNAC findings and is calculated by:

**Figure 11**

NPV(%) =	$\begin{aligned} &\text{TN} / \text{TN} + \text{FN} \times 100 \\ &= 36 / 36 + 1 \times 100 \\ &= 97.29 \% \end{aligned}$
----------	---

**DISCUSSION**

FNAC contributes significantly to the pre-operative investigation in patients with thyroid swelling but despite its well recognised value there are limitations to the technique. The first such drawback of FNAC is the high inadequate sample rate<sup>3,4</sup>. The second major limitation of thyroid cytology is its inability to distinguish follicular adenoma from follicular carcinoma<sup>4,5,7,8</sup>. This diagnosis requires detailed histological examination for vascular or capsular invasion and cannot be reliably made on routine FNAC specimens<sup>9,10,11,12</sup>. Hence, follicular neoplasm (lesion) is given as diagnosis in FNAC. In our study out of 50 cases female were higher in frequency ( n=46 ; 92% ) than men ( n=4 ; 8% ). The youngest patient of our series was a girl of 13 years with colloid goitre and the oldest patient was a man of 72 years, a case of follicular carcinoma.

Carcinoma of the thyroid is the most common malignancy of endocrine system comprises 0.6% and 1.6% of all cases of malignant neoplasm in men and women respectively (Aravindan, 2006). In our study FNAC showed thirty seven (74%) non neoplastic and thirteen (26%) neoplastic. Among nonneoplastic thyroid swelling, colloid goitre was common

twenty seven (54%), followed by nodular goitre which was six (12%) and multinodular goitre four cases (8%). Among neoplastic thyroid swelling Papillary carcinoma was the most common seven (14%) followed by Follicular neoplasm four (8%). Our study was compared with the study of Md. Shafiqul Islam which showed 78% nonneoplastic and 22% neoplastic cases (papillary carcinoma, 15.56% and follicular lesion (3.33%)<sup>16</sup>. One case of Nodular goitre in FNAC was diagnosed as Papillary carcinoma in histopathological examination and one case of Follicular neoplasm in FNAC was diagnosed as Colloid goitre in histopathological examination. It is to be stressed that all cases of papillary carcinoma diagnosed by FNAC were papillary carcinoma on histopathological examination also. This is in accordance with previous studies<sup>17,18</sup>.

**Figure 12**

Table 4: Comparison between sensitivity and specificity of our study with other studies

Authors	Year	Sensitivity	Specificity
Haruna A. Nggada, Alhaji B. Musa	2003	98%	100%
E. Razmpa, H. Ghanaati	2000	92.3%	88.1%
Mustapha I.A. Khalil	2001	85%	88%
Abdulqadir Maghded Zangana <sup>20</sup>	2003	90%	100%
Our study	2010	91.66%	97.29%

Cytological study of FNAC of thyroid swelling from 50 patients showed a sensitivity of 91.66% and specificity of 97.29 % which were compared with other studies as shown in table 4. The percentage of malignant tumor diagnosis was 26% in our study which was higher than that reported by Abdulqadir Maghded 13.3%, Zangana Mustapha I.A. Khalil 3%, and Haruna A. Nggada, Alhaji B. 13.7 %.

**Figure 13**

Table 5: Predictive value for negative result of FNAC

Author	No. of FNAC	Diagnostic accuracy	False negative	Predictive value for negative result
Frable, 1976	20	95%	5	95%
Gershengom et	33	89%	3	97%

The accuracy, percentage of false positive and the predictive value for negative result of FNAC as reported by the workers<sup>21-23</sup> in this field are shown in Table 5. Our study revealed diagnostic accuracy of 94% which was almost same as the diagnostic accuracy of Frable. The predictive value for negative result of present study was 97.29% as was found in the study by Gershengom et al in 1977.

**CONCLUSION**

FNAC is a simple, safe and cost-effective diagnostic modality in the investigation of thyroid disease with high specificity and accuracy. We concluded that FNAC diagnosis of malignancy is highly significant. A benign FNAC diagnosis should be viewed with caution as false negative results do occur and these patients should be followed up and any clinical suspicion of malignancy even in the presence of benign FNAC requires surgery. So, final diagnosis and treatment pattern should be based upon histopathology.

**References**

1. E. C. Ridgway. Clinical evaluation of solitary thyroid nodules, in *The Thyroid: A Fundamental and Clinical Text*. G. B. Lippincott, Philadelphia, Pa, USA .1986 ; 1377–85.
2. R. Bakhos, S. M. Selvaggi, S. DeJong. Fine needle aspiration of the thyroid: rate and causes of cytopathologic discordance. *Diagn Cytopathol*, 23( 4); 233–7.
3. Burch HB, Burman KD, Reed HI, Buckner L, Raber T, Ownbey JI. Fine needle aspiration of thyroid nodules. Determinants of insufficiency rate and malignancy yield at thyroidectomy. *Acta Cytol* 1996; 40: 1176-83.
4. Gharib H, Goellner JR. Fine-needle aspiration biopsy of the thyroid: an appraisal. *Ann Intern Med* 1993; 118: 282-9.
5. Franklyn JA, Sheppard MC. Aspiration cytology of thyroid. *BMJ* 1987; 295: 510-1.
7. Lowhagen T, Willems J, Lundell G, Sundblad R, Granberg P. Aspiration biopsy cytology in diagnosis of thyroid cancer. *World J Surg* .1981; 5: 61-73.
8. Al-Sayer HM, Krukowski ZH, Williams VMM, Matheson NA. Fine needle aspiration cytology in isolated thyroid swellings: a prospective two year evaluation. *BMJ* 1985; 290: 1490-2.
9. Anderson JB, Webb AJ. Fine-needle aspiration biopsy and the diagnosis of thyroid cancer. *Br J Surg* 1987; 74: 292-6.
10. Leonard N, Melcher DH. To operate or not to operate? The value of fine needle aspiration cytology in the assessment of thyroid swellings. *J Clin Pathol* 1997; 50: 941-3.
11. Gardner HA, Ducatman BS, Wang HH. Predictive value of fine-needle aspiration of the thyroid in the classification of follicular lesions. *Cancer* 1993; 71: 2598-603.
12. Miller JM, Kini SR, Hamburger JI. The diagnosis of malignant follicular neoplasms of the thyroid by needle biopsy. *Cancer* 1985; 55: 2812-7.
13. Kingston GW, Davis SP. Role of frozen section and clinical parameters in distinguishing benign from malignant follicular neoplasm of thyroid. *Am J Surg* 1992; 164:603-5.
14. Dwarakanthan AA, Starsen ED, D Amore MJ. Importance of repeat fine needle biopsy in the management of thyroid nodule. *Am J Surg* 1993; 166:350-2.
15. Suresh K, Shakil A, Abdullah D. Role of fine needle aspiration cytology in Thyroid diseases. *Journal of Surgery Pakistan (International)* 13 (1) January - March 2008.
16. Md. Shafiqul I, Belayat H S , Nasima A, Kazi S S, Mohammad A. Comparative study of FNAC and histopathology in the diagnosis of thyroid swelling. *Bangladesh J Otorhinolaryngol*. 16 (1); April 2010.
17. N. Dorairajan and N. Jayashree, Solitary nodule of the thyroid and the role of fine needle aspiration cytology in diagnosis. *Journal of the Indian Medical Association*. 1996; 94 (2); 50–2.

18. A. Kessler, H. Gavriel, S. Zahav, et al., Accuracy and consistency of fine-needle aspiration biopsy in the diagnosis and management of solitary thyroid nodules. *Israel Medical Association Journal*. 2005; 7( 6); 371–3.

19. Razmpa, E., H. Ghanaati, B. Naghibzadeh, P. Mazloom and A. Kashfi. *acta medicina Iranica The Journal of the Faculty of Medicine, Tehran University of Medical Sciences*. 2002; 40: 3.

20. Abdulqadir M, Zangana S, Abu B, Sherwan A G. A Comparative Study Between Cytological and

Histopathological Findings in Thyroid Swellings in Erbil City. *Adv. in Med. Dent. Sci*. 2009; 3(1): 29-34.

21. Frable WJ. Fine needle aspiration biopsy. A personal experience with 469 cases. *Am J Clin Path* 1976;65:168-82.

22. Gershengorn MG, McLung MR, Chu EW, Hanson TA et al. Fine needle aspiration cytology in the preoperative diagnosis of thyroid nodules. *Ann Inter Med*. 1977; 87:265-9.

23. Rosen IB, Wallace C, Strawbridge HG, Walfish PG. Re-evaluation of needle aspiration cytology in detection of thyroid cancer. *Surgery*. 1981;90:747-6.

**Author Information**

**Nepali R**

Lecturer, ENT & HNS Department, Gandaki Medical College

**Banita V**

Lecturer, Pathology Department, Gandaki Medical College

**Thakur G**

Lecturer, Pathology Department, Gandaki Medical College