

## ORIGINAL RESEARCH

# A study of correlation between fine needle aspiration cytology and histopathological examination of thyroid swellings

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### ABSTRACT

**Background:** Neck swelling is common clinical presentation in E.N.T practice. Enlargement of thyroid remains a problem of enormous magnitude all over the world. It becomes a challenge to come out with proper diagnosis and management. This study is undertaken to study the cytology of palpable thyroid lesions to minimize surgical intervention and correlating the same with the thyroid function test and histopathological examination to confirm the diagnosis and planning post-surgical management of malignant thyroid lesions.

**Methods:** This is interventional prospective study, done at ENT department of civil hospital, Rajkot. The aim of our study is to find correlation between fine needle aspiration cytology and histopathology of thyroid swellings, to assess accuracy of fine needle aspiration cytology in evaluation of thyroid swelling and to perform clinical assessment of different types of thyroid swellings with sample size of 100 patients. Those patients presenting with thyroid swellings who underwent Fine Needle Aspiration Cytology, thyroid surgery and histopathological examination are included and thyroid swelling patients which were not operated are excluded.

**Results:** Various factors regarding clinical examination, investigation, histopathological characteristics, operative treatment and follow up of the patients have been analysed. The maximum incidence of thyroid lesions, are between the ages of 31 – 40 years. More malignant cases are seen during third decade of life. The colloid goitre is the most common pathology found. Some cases of papillary carcinoma thyroid without palpable neck nodes. Hemithyroidectomy is the most commonly (73%) done surgery. In present study, accuracy of FNAC is 93%.

**Conclusions:** Sensitivity and specificity of FNAC in detecting thyroid pathology is 85% and 100% respectively. In present study, out of 92 (92%) cytological diagnosed cases, 88 (95.65%) cases were confirmed benign on histological diagnosis and (4.35%) was malignant on histological diagnosis. These findings are comparable with results carried out by the other studies reported earlier. FNAC is gold standard in the selection of the patients for surgery. FNAC too requires expertization. The main limitation of thyroid FNAC is the inability to distinguish between follicular adenoma and carcinoma.

**Key words:** FNAC, Thyroid swelling, Sensitivity and specificity

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### Introduction

In the management of thyroid swellings, the primary challenge is to separate benign nodules from malignant lesions. The benign thyroid swellings don't require thyroidectomy except some special consideration like cosmesis, large swelling compressing adjacent structures or large retrosternal goitre etc. Looking upon some serious complications of thyroidectomy proper case selection is paramount in case of thyroid swellings. Simultaneously, under treatment of malignant thyroid disease is also very harmful to the patient. Hence pre-operative diagnosis is very important in case of thyroid surgery.

However, the distinction of these benign lesions from a malignant nodule cannot be based reliably on the clinical presentation alone. In the past, pre-operative assessment and diagnosis of various thyroid lesions would not be complete without histopathological examination of excised thyroid specimen. It is inconvenient and expensive for the patients. Hence, there was a constant search for easier and quicker means of diagnosis of thyroid lesions. Over the years, various tests *viz.*, high resolution ultrasonography, thyroid nuclear scan, <sup>99m</sup>Tc-pertechnetate scan etc., have evolved and have been applied to the pre-operative assessment of thyroid lesions.

Main stem diagnosis of thyroid swellings is by clinical mean, Fine Needle Aspiration Cytology, and histopathology but they differ in many occasions and therefore this comparison is done with view to make correlation between Fine Needle Aspiration Cytology and histopathology. Important factors for satisfactory test include adequate sample, sampling technique and an experienced cytologist to interpret the findings. Here arises the need for histopathological examination, as it is considered the final diagnostic test. This also raises the question of how much corroborative is Fine Needle Aspiration Cytology and Histopathological examination.

### Aims and Objectives

To find correlation between fine needle aspiration cytology and histopathology of thyroid swellings. Accuracy of fine needle aspiration cytology in evaluation of thyroid swellings preoperatively and plan the management accordingly.

### Materials and Methods

The aim of our study is to find correlation between fine needle aspiration cytology and histopathology of thyroid swellings, to access accuracy of fine needle aspiration cytology in evaluation of thyroid swelling

and to perform clinical assessment of different types of thyroid swellings.

This is an interventional prospective study design with sample size of 100 patients and done at tertiary hospital. All patients were evaluated with thorough clinical examination. Those patients presenting with thyroid swellings who underwent FNAC with ultrasonography and thyroid function tests then selected for thyroid surgery with probable diagnosis are included in the study. These included patients investigated for preoperative blood reports and X ray neck. CT scan and tumour marker were done in few cases. Those patients whose Fine Needle Aspiration Cytology was done but not underwent thyroid surgery are excluded from surgery. Post operative histopathological examination was done in all patient. The cytology reports are compared with histopathological diagnosis. Sensitivity, Specificity, and accuracy are calculated.

### Results

Various factors regarding clinical examination, investigation, histopathological characteristics, and operative treatment of the patients have been analysed.

**Table 1: Age distribution of the thyroid cases in present study**

Age (in years)	No. of patients	Percentage (%)
11-20	08	08
21-30	16	16
31-40	36	36
41-50	23	23
51-60	10	10
61-70	06	06
71-80	01	01
Total	100	100

**Table 2: Age distribution of benign and malignant cases in present study (according to histopathology)**

Age (in years)	No. of benign cases	No. malignant cases	Total
11-20	07	01	08
21-30	16	01	17
31-40	29	06	35
41-50	20	03	23
51-60	09	01	10
61-70	06	00	06
71-80	01	00	01
Total	88	12	100

It is evident from the table 1 and 2 that the maximum incidence of thyroid lesions, are between the ages of 31 – 40 years and thyroid disease prevalent in all age groups but most of the cases reported in 2nd, 3rd, and

4th decade. The youngest patient was of 19 years and oldest patient was 70 years. More malignant cases are seen during third decade of life. There was no case reported below 10 years and above 80 years of age.

**Table 3: Gender distribution of thyroid cases in present study**

Sex	No. of patients
Male	18
Female	82

**Table 4: Mode of presentation (symptoms) of thyroid cases in present study**

Mode of presentation(symptoms)	No. of patients	Percentage (%)
Neck swelling	100	100
Pain	13	13
Dysphagia	08	08
Dyspnoea	01	01
Weight loss	08	08
Hoarseness of voice	00	00

As shown in the table no. 4, the present study of 100 cases shows that all 100 cases are present with neck swelling which is the most common mode of

presentation. Pain at the swelling site is second most common symptom.

**Table 5: Thyroid swelling with enlarged lymph nodes in present study**

Neck node	No. of patients	Percentage (%)
Yes	06	06
No	94	94
Total	100	100

As shown in the table no. 5, the present study of 100 cases shows that 94 (94%) cases do not have neck nodes palpable on examination. These cases seem benign in nature, still final diagnosis is based on

histopathology report obtained postoperatively. Some cases of papillary carcinoma thyroid do not have palpable neck nodes. While 6% cases have neck nodes palpable with their FNAC showing carcinoma.

**Table 6: Various types of surgery done in thyroid cases in present study**

Type of surgery	No. of patients	Percentage (%)
Hemithyroidectomy	73	73
Subtotal thyroidectomy	10	10
Total thyroidectomy	13	13
Total thyroidectomy with neck dissection and central compartment clearance	04	04
Total	100	100

In our study 89 cases were euthyroid, 07 cases were hypothyroid and 04 cases were hyperthyroid. Table-06 shows various type of surgery done in present study, keeping in view with findings of FNAC, USG and follow up Histopathology. Out of which

hemithyroidectomy is the most commonly (73%) performed surgery. Cases with proved carcinomatous lesion and positive neck nodes are posted for total thyroidectomy with neck dissection and central compartment clearance.

**Table 7: Correlation of the findings of cytology and histopathology of benign and malignant thyroid cases**

Procedure	No of benign cases	No of malignant cases	Total
FNAC	92	08	100
Histopathology	88	12	100

Chi-square value - 0.479, DF (degree of freedom) – 1, P value - 0.49  
Incidence of benign cases are more than malignant.

**Table 8: Correlation of the findings of cytology and histopathology reports**

Findings	FNAC	Histopathology
Cystic lesion	25	10
Hashimoto’s thyroiditis	00	01
Lymphocytic thyroiditis	01	01
Colloid goitre	58	63
Hyperplastic thyroid lesion	01	04
Follicular adenoma	07	09
Follicular carcinoma	02	02
Papillary carcinoma	06	09
Medullary carcinoma	00	01
Anaplastic carcinoma	00	00

Chi-square value - 13.162, DF (degree of freedom) – 8, P value - 0.106

Out of 100 cytological diagnosed cases of thyroid lesions, 58 cases of colloid goitre, 01 case of each Hyper-plastic thyroid lesion and Lymphocytic thyroiditis, 02 of follicular carcinoma, 25 cases of cystic lesions and 06 papillary carcinoma were found. Out of 100 histopathological diagnosed cases of thyroid lesions, 63 cases of colloid goitre, 10 cases of cystic lesions, 09 cases of each follicular adenoma and papillary carcinoma, 4 cases of hyperplastic lesions, 2 cases of follicular carcinoma, 1 case of each lymphocytic thyroiditis, Hashimoto’s thyroiditis and medullary carcinoma were found. No cases of anaplastic carcinoma detected.

**Discussion**

FNAC is a method where a very small quantity of tissue, fluid and cells are aspirated from a lesion for cytological examination. Although needle aspiration cytology had been performed intermittently in the second half of the last century, it was popularized by Martin, Ellis and Stewart at Memorial Hospital for Cancer and Allied Diseases, New York in the 1930.

FNAC is now accepted as the cost effective, minimally invasive, low complication, non-operative diagnosis for most of the thyroid lesions and is highly successful in triaging the patients with solitary thyroid nodule in to non-operative and operative group. The location of target lesion, careful searching for malignant cells and repeat FNAC is the key to successful diagnosis to plan proper surgical management in thyroid mass.

The distinction of benign and malignant thyroid nodules is fundamental, as malignancy necessitate surgery while strict patient follow up is necessary in case of benign thyroid mass. FNAC is gold standard in the selection of the patients for surgery.

In experienced hand the reliability and accuracy of FNAC is very high. High degree of expertise is required for the process of performing the needle aspiration as well as in the interpretation of the smears.

During the present study, no complication like hematoma, transient laryngeal nerve palsy or perforation of trachea was noted.

**Table 1: Comparison of Age**

Studies	Range of age in years	Median age in years
Tabaqchali <i>et al</i> (2000) <sup>39</sup>	8.5 – 85	48
Afroze N <i>et al</i> (2002) <sup>40</sup>	16 – 78	40.2
Handa <i>et al</i> (2008) <sup>41</sup>	5 – 80	37.69
Gupta <i>et al</i> (2010) <sup>42</sup>	22 – 58	h38.72
Sengupta <i>et al</i> (2011) <sup>38</sup>	10 – 60	35
Present Study	15 – 75	38

Table no. 1 shows the comparison of age incidence in the present study with other studies. In the present study median age was 38 years. In Sengupta *et al* also showed the same result. In Tabaqchali *et al* and

Afroze *et al* showed median age above 40 years. This variation is due to fact that these studies were not performed in particular age group or as a screening programmed, but randomly done on the patients coming to the hospital with thyroid lesion.

**Table 2: Comparison of sex**

Studies	Total cases	Male	Female	Male: Female
Tabaqchali <i>et al</i> (2000)	239	26	213	1:82
Afroze N <i>et al</i> (2002)	170	48	122	1:2.54
Handa <i>et al</i> (2008)	434	59	375	1:6.35
Gupta <i>et al</i> (2010)	75	6	69	1:11.5
Sengupta <i>et al</i> (2011)	178	37	141	1:3.81
Present Study	100	18	82	1:4.55

Table 2 shows the sex distribution in thyroid lesions. There was the predominance of female patients in all studies.

**Table 3: Comparison of thyroid lesions**

Studies	Thyroid lesions							
	Cystic lesion	Thyroid-itis	Colloid goiter	Follicular adenoma	Papillary ca.	Follicular ca.	Medullary ca.	Anaplastic ca.
Tabaqchli (2000)	2 0.4%	7 2.9%	136 56.9%	60 25.1%	19 7.9%	10 4.2%	3 1.3%	1 0.4%
Afroze	0	10	111	27	11	07	02	02

(2002)	0%	5.88%	65.3%	15.88%	6.47%	4.11%	1.18%	1.18%
Handa (2008)	2 3.03%	0	45 68.2%	13 19.70%	3 4.55%	0	2 3.03%	1 1.52%
Gupta (2010)	0 0%	3 4%	42 56%	15 20%	12 16%	3 4%	0 0%	0 0%
Sengupta (2011)	0 0%	15 8.43%	135 75.8%	11 6.18%	0	14 8.99%	0	7 3.93%
Present study	10 10%	2 2%	63 63%	9 9%	9 9%	2 2%	1 1%	0 0%

As shown in the above table, percentage of incidence of various thyroid lesions of present study is nearer to study of Sengupta *et al* and Handa *et al*. In present study predominate lesions were benign while there were higher percentage of malignant lesion in Tabaqchali *et al* and Afroze *et al* studies.

**Table 4: Comparison of non-neoplastic to neoplastic ratio**

Studies	Non-neoplastic (A)	Neoplastic (B)	A: B
Tabaqchali (2000)	145	94	1.54: 1
Afroze (2002)	121	49	2.47: 1
Handa (2008)	47	19	2.48: 1
Sengupta (2011)	150	32	4.68: 1
Present Study	88	12	7.33: 1

As shown in above table, there was higher percentage non-neoplastic lesion in present study. This study documented the fact that the benign lesions of thyroid are the most common lesions. Such lesions are more common in young females. This increased case of benign lesions indicates increase awareness of patients and they consult for the same.

**Table 5: Comparison of Cyto-histo correlation of benign lesions**

Studies	Total no. of cases	No. of Benign lesions	Histopathological diagnosis	
			Benign	Malignant
Afroze <i>et al</i>	170	115 (67.64%)	113 (98.26%)	02 (1.74%)
Handa <i>et al</i>	66	60 (90.09%)	59 (98.33%)	1 (1.66%)
Gupta <i>et al</i>	75	63 (84%)	60 (95.24%)	3 (4.76%)
Present study	100	92 (92%)	88 (95.65%)	4 (4.35%)

Table no 5 shows cyto-histo correlation of benign lesions of present study with other studies. In present study, out of 91 (91%) cytological diagnosed cases, 88 cases were confirmed benign on histological diagnosis and 4 were malignant on histological diagnosis. On FNAC, it was diagnosed as benign lesion because there was fluid aspirate, probably from the cystic component. So in such cases site of aspiration is important. In suspicious cases, patient should undergo ultrasound examination and if cystic component is noted, guided FNAC should be done.

**Comparison of Cyto-Histo correlation of malignant lesions**

Cyto-histo correlation of malignant lesions of present study with other studies. In present study there was 97% correlation observed in case of malignant lesion. Handa *et al* also observed 100% correlation while Afroze *et al* observed 92.3% correlation in their studies.

**Table 7: Comparison of diagnostic value for malignant lesions**

Studies	Year	Sensitivity %	Specificity %
Amrikachi <i>et al</i> <sup>44</sup>	2000	93.0	96.0
Tabaqchali <i>et al</i>	2000	86.8	67.0
Ergete <i>et al</i>	2002	67.0	84.7
Ko <i>et al</i> <sup>45</sup>	2003	78.3	98.2
Safirullah <i>et al</i> <sup>46</sup>	2004	94.2	94

Handa <i>et al</i>	2008	97	100
Gupta <i>et al</i>	2010	80	86.6
Sengupta <i>et al</i>	2011	90	100
Present Study	2015	85	100

The sensitivity of the test means the ability of the test to identify correctly all those who have the disease, which are 'true positive' results. Sensitivity of FNAC for diagnosis of malignancy means its ability to diagnose all those patients correctly who have malignancy. The sensitivity of the present study is 85%. In other studies, 67% to 97% percentage of sensitivity were observed.

The specificity of the test means the ability of the test to identify correctly all those who do not have the disease, which are 'true negative' results. Specificity of FNAC for diagnosis of malignancy means its ability to diagnose all those patients correctly who do not have malignancy. The specificity of the present study is 100%. Handa *et al* and Sengupta *et al* also observed 100% specificity in their studies.

### Conclusion

At the end, conclusion is that the fine needle aspiration cytology is a simple, safe, cost effective, quick, scarless and relatively painless procedure which can be used as a first line diagnostic procedure in patient presenting with thyroid swelling especially in developing countries. Special histochemical and immunohistochemical techniques can be applied to it. Its accuracy can approach to that of histopathology.

FNAC diagnosis of malignancy is highly significant and such patients should be subjected to surgery. 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. When combined with clinical examination, hormone study and imaging technique, FNAC gives more accurate results for diagnosis. Non representative aspirations may occur in a blind procedure, but this has been rectified by imaging guidance. Fine Needle Aspiration Cytology, however, is not without limitations related to interpretation of the aspirate as overlapping cytological features in neoplasm. The main limitation of thyroid FNAC is the inability to distinguish between follicular adenoma and carcinoma.

### References

1. Surgery of Thyroid and parathyroid, M.D. Raddal, 1-596.
2. Weber AL, Raddal G. Aksoy FG: The thyroid and parathyroid glands. CT and MR imaging and correlation with pathology and clinical findings. Radiological clinics of North America 2000, 38: 1105 - 29.
3. Hoffman GL *et al*: The solitary thyroid nodule. Arch. Surg. 105, 319-384.
4. International Journal of Otorhinolaryngology, Head and Neck surgery, April 2008, 16-32. Surgical clinics of North America, 2004, 1735 - 741.
5. M. M. Kapur: Solitary thyroid nodule. Indian Journal of Surgery, March 1982, 174-179.
6. Brooks J.R. The solitary thyroid nodule. Am. Journal of Surgery 125, 477, 1973.
7. Becker D, Charkes ND, D. Workin H, Hurley J, McDougall JR, prince D *et al*: Procedure of thyroid scintigraphy. Journal of nuclear medicine 1996; 37, 1264-6.
8. F. Lida *et al*: Thyroid Carcinoma Wort J. Surg. vol.15, No.4, July / August 1991.
9. Takashima S, Fukada H, Kobayshi T. Thyroid nodule's: Clinical effect of ultrasound - guided fine needle aspiration biopsy. Journal of clinical ultrasound: 1994, 22: 535
10. LaRosa GL: BelFiore A. Guiffida D. Sicurek C. Ippolito O. Ausso G *et al*: Evaluation of Fine Needle aspiration biopsy in the pre-operative selection of cold thyroid nodule. Cancer, 1991; 67, 2137-41.
11. Baloch ZW, Fleisher S, LiVolsi VA, *et al*. Diagnosis of follicular neoplasm: A gray zone in thyroid fine needle aspiration cytology. Diagn Cytopathol 2002; 26:41.
12. Kline TS. Thyroid gland. Hand book of fine needle aspiration biopsy cytology. 1981. p. 85-113.
13. A Comparative study of Fine Needle Aspiration Cytology Versus Histopathological examination in diagnosis of thyroid swelling from Journal of Head and Neck Surgery, 2011 issue 2 vol.5.
14. Clinopatho correlation of thyroid nodule an article from D.Y.PATIL Fine Needle Aspiration Cytology Medical College, Pimpri, PUNE, July, 2012.
15. Diagnostic pit falls in evaluation of Fine Needle Aspiration Cytopathology in case of thyroid, Cytopathology Vol. 20 Issue 2 (page no. 103-108).
16. Thyroid Gland – Recurring problems in histological and cytological evaluation, William-Faquin Archives of Pathology and Laboratory Medicine, Vol.132 (Page no. 622-632).
17. Correlation of Fine Needle Aspiration Cytology with histopathology in diagnosis of solitary thyroid nodule from Manoj Gupta, Savita Gupta and Vedbhusan Gupta.
18. A Comparative study of Fine Needle Aspiration Cytology Versus Histopathological examination in diagnosis of thyroid swelling from Indian Journal Of Otolaryngology and Head and Neck

- Surgery, S.C.B. Medical College, Cuttack, India, Kalinga Institute of Medical Science.
19. Van Herle A.J.: Management of thyroid nodule – II scanning technique, thyroid suppressive therapy, and fine needle aspiration. *Head and neck surgery*. 297 – 322.
  20. Park K. *Park's textbook of preventive and social medicine*. 19th edition. 2007 p. 119 -120.
  21. Sengupta A, Pal R, Kar S *et al*. Fine needle aspiration cytology as the primary diagnostic tool in thyroid enlargement. *Journal of Natural science, Biology and Medicine* 2011 January; 2(1): 113-118.
  22. Tabaqchali MA, Hanson JM, Johnson SJ *et al*. Thyroid aspiration cytology in newcastle: a six year cytology/ histology correlation study. *Ann R Coll Surg Eng* 2000; 82: 149-155.
  23. Afroze N, Kayani N, Husain SH. Role of fine needle aspiration cytology in the diagnosis of papable thyroid lesion. *Indian Journal of Pathology and Microbiology* 2002; 45(3): 241-246.
  24. Handa U, Garg S, Mohan H, Nagarkar N. Role of fine needle aspiration cytology in diagnosis and management of thyroid lesions: A study on 434 patients. *Journal of cytology* 2008; 25(1): 13-17.
  25. Gupta M, Gupta S, Gupta VB. Correlation of Fine Needle Aspiration Cytology with Histopathology in Diagnosis of Solitary Thyroid Nodule. *Journal of Thyroid Research* 2010; id 739051.
  26. Sang CK, Kigonde CS, Muchiri L. Correlation between cytology and thyroid function test. *East African Medical Journal* 2006; 83(10): 533-538.
  27. Amrikachi *et al*. Accuracy of thyroid fine needle aspiration of thyroid. *Arch Pathol lab Med* 2001; 125: 484-488.
  28. Ko *et al*: Clinicopathologic analysis of fine needle aspiration cytology of the thyroid. *Acta Cytol* 2003; 47 (5): 727-732.
  29. Bancroft JD. *Theory and Practice of histological techniques*. 4th edition. Hong Kong: Churchill Livingstone; 1996. p. 99 -112, 306 - 307.