

ASPIRATION BIOPSY CYTOLOGY OF SOLITARY THYROID NODULE

Prakash H MuddeGowda¹, Jyothi B Lingegowda², Shankar S Hiremath³,
Kishanprasad HL⁴, Dr.Ramaswamy AS⁵, Aravinda P⁶

ABSTRACT

Background :

Fine needle aspiration cytology is a diagnostic tool used in the clinical workup of solitary thyroid nodules, to triage them into operative and non-operative lesions, as they have higher incidence of malignancy.

Methods :

Prospective study to find the utility of fine needle aspiration cytology (FNAC) in solitary thyroid nodules, conducted at JJM Medical College, Davanagere. Fine needle aspiration specimens from 162 patients with solitary thyroid nodule were analyzed. In 70 patients histopathological study was made and cyto-histopathological correlation was done.

Results:

Out of 162 cases, female sex was found predominant (87.65%) and mean age of the patients was 35.67 yrs. Sensitivity, specificity and efficacy of the study for malignancy were 66.66%, 98.4% and 95.71% respectively.

Conclusions:

Although FNAC is a good diagnostic tool for solitary thyroid nodules, ultrasound guided FNAC would have been better option for increasing accuracy of the diagnosis.

Key Words : FNAC, solitary thyroid nodule, cyto histopathological correlation.

INTRODUCTION:

Solitary thyroid nodules (STN) have long been a difficult diagnostic problem. Most of the investigations have found not to be accurate. Radio-isotope can differentiate between hot and cold nodules, whereas cold nodules

have an incidence of 20% malignancy. Although hot nodules are unlikely to be malignant, it is always not true. Ultrasonography can distinguish between cystic and solid lesions, but no pathological differentiation can be done. Techniques such as thermography, angiography, seleolethionine scanning, and molecular analysis have not found to be practical with unjustifiable cost increase or are not generally available^{1,2}.

Fine needle aspiration cytology (FNAC) in recent years has proved to be a key diagnostic procedure and is now accepted as a cost effective, minimally invasive procedure in the initial assessment and management of thyroid enlargement. It has been shown that FNAC is successful in triaging patients with STN into operative and non-operative groups. Excising all thyroid nodules is impractical, as most thyroid nodules are benign and thyroid surgery is not without risks^{2,3,4}.

The incidence of thyroid cancer in a clinically STN or in a multi-nodular goiter is about 5% in non-endemic areas. These constitute the main indication for FNA, and the goal of this diagnostic procedure is to detect thyroid neoplasms for surgical resection and to manage non-neoplastic lesions conservatively. This method of investigation has reduced the number of diagnostic surgeries for STN by 60-85% and the difference in rates of thyroid surgery reflect the cytodiagnostic accuracy rates among different medical centres.³

Published data suggests FNA has an overall accuracy rate around 75% in the detection of thyroid malignancy. Several studies have confirmed the accuracy and reliability of FNAC in the differentiation between relatively smaller number of malignant thyroid nodules and the larger percentage of nodules that are benign^{5,6}.

In this study we try to assess the accuracy and usefulness of fine needle aspiration cytology in the diagnosis of STN in our local population.

^{1,2}Assistant Professor, Department of Pathology, VMKV Medical College, Salem.

³Professor & HOD, Department of Pathology, JJM Medical College, Davanagere.

⁴Assistant Professor, Department of Pathology, KS Hegde Medical College, Mangalore.

⁵Assistant Professor, Department of Pathology, PES Medical college, Kuppam.

⁶Assistant Professor, Department of Pathology, AJ Shetty Medical College, Mangalore.

Materials & Methods :

This study emphasizes on the role of FNAC in the diagnosis of STN. Material for the present study was obtained prospectively over a period of two years from the Department of Pathology, JJM Medical College, Davanagere. All the aspirations were performed by the pathologists. Before aspiration, physical examination of the thyroid gland was carried out to assess the size, mobility during deglutition, its nodularity, and evidence of clinical signs of thyrotoxicosis. Neck nodes were also palpated for enlargement.

Aspiration was performed using a 10 ml syringe with 23G needle and syringe holder. Non-aspiration technique was also used sometimes to reduce the contamination of the specimen. The number of passes was kept to a minimum to minimize hemorrhage, and was usually two to three. Each case had a minimum of three smears and were stained with H&E, Pap and Geimsa stains.

A total of 564 thyroid aspirations were performed during this period of which 162 cases of clinically detected solitary thyroid nodule with follow-up histopathological correlation in 70 cases.

We followed the criteria of Papanicolaou society of cytopathology⁷ for the adequacy of the smear. When a large amount of colloid material was observed on the smear, regardless of the number of follicular epithelial cell clusters, we used it for the diagnosis of Colloid goiter or when a smear contained one or two small clusters of malignant or highly atypical cells, it was reported as malignant or suspicious for malignancy and not as unsatisfactory smear.

Results of cytological and histopathological studies were later correlated to evaluate the efficacy of FNAC. The results of this study were calculated by using the methodology of Galen and Gambino for substantiating the correlation.⁸

RESULTS:

Of the 162 patients, 142 (87.65%) were females, and 20 (12.35%) were males. Male to female ratio was 1:7.1. Age of the patients ranged from 12 to 85 years. The majority of the patients were aged between 30-39 years i.e. 48 (29.62%) cases. The duration of the lesions varied from 15 days to 10 years. Based on location 100 (61.72%) patients had STN in right lobe followed by 52 (32.10%) patients in left lobe and remaining 10 (6.18%) in isthmus region.

Out of the 162 cases, 138 (85.18%) were non-neoplastic lesions and the other 24 (24.82%) were neoplastic lesions

on cytological evaluation. The ratio of non-neoplastic to neoplastic lesions was 5.75:1. Cyto-histopathology correlation was found in 70 cases (Table 1) and this formed the crux of the study.

There were 31 cases of indeterminate fnac, out of which 26 were labelled as neoplasm and remaining five were uncommitted due to sampling error. On FNAC there were 27 cases of benign lesions, comprising of colloid goiter, adenomatous hyperplasia, follicular adenoma and Hashimotos thyroiditis. On FNAC about five cases showed feature of malignancy, among these two cases were clearly committed as malignant lesions on FNAC, constituting of one case of papillary carcinoma and one case of medullary carcinoma, while three cases were labeled as suspicious for malignancy.

Comparison with histopathology revealed that there were no cases of indeterminate diagnosis. There were 64 cases of benign thyroid lesions, and six cases of malignant lesions. Of 34 cases of benign lesions found on FNAC, only 25 were found to be colloid goiter, one was adenomatous hyperplasia, one was Hashimotos thyroiditis, six cases were of follicular adenoma and last case turned out to be papillary carcinoma.

Out of six malignant cases (histopathology), there were five cases of papillary carcinoma and one case of medullary carcinoma.

After comparison of results of FNAC with histopathology, overall sensitivity of FNAC was found to be 66.66%, specificity as 98.4% and accuracy as 95.71%. We compared our results of FNAC with the experience of other investigators from other regions of the world.

DISCUSSION:

FNAC plays an important role in the diagnosis of STN. Nature of disease, experience and understanding of certain limitations determine its diagnostic utility⁹. In this study STN aspirates were examined for their diagnostic utility.

This study deals with FNAC of thyroid performed in 162 patients and it formed 28.72% of the thyroid aspirations done during the same period.

Mean age of the patients under study was 35.67 yrs which correlated with the study of other authors and the majority of them were females, with female to male ratio being 7.1:1 which is comparable to other studies^{10,11,12}.

Among the 34 cases of benign lesions, one cases of papillary carcinoma (histopathology) was given out as missed on cytology, which was possibly due to the small

size of the lesion (1-2cm) and needle not hitting the target. Amongst the indeterminate lesions, one case of papillary carcinoma was missed on cytology, possibly due to absence of characteristic diagnostic features in the smear.

Colloid goiter was the commonest benign lesion in our study, with characteristic colloid rich background and sheets of follicular cells. Scattered macrophages were seen in few cases, suggesting cystic change in colloid goiter. Macrofollicular adenoma uncommonly are misdiagnosed as colloid goiter, due to the presence of abundant colloid. Adenomatous nodule often show both features of incomplete capsulation with sheets of microfollicles and abundant to scant colloid and often becomes difficult to differentiate between follicular adenoma and adenomatous goiter^{2,10,11,13}.

Follicular neoplasm forms a gray zone, with the differential diagnoses including follicular carcinoma, follicular variant of papillary carcinoma (FVPC), follicular adenoma and adenomatoid nodule. Colloid goiter often forms a part of this group due to difficulty in differentiating between follicular neoplasm and nodular goiter. The most important clue in diagnosing follicular neoplasm is abundant blood containing rare microfollicles^{13,14,15,16}.

Cytodiagnosis of one case of Hurthle cell adenoma (histopathology) was made accurately due to presence of increased number of Hurthle cells (>90%) with few binucleates and increased hemorrhage. If aspirates contain more than 75% Hurthle cells, the possibility of Hurthle cell neoplasm is to be considered, in the absence of which non-neoplastic Hurthle cell rich lesions is to be suspected^{2,17,18}.

In the published data (Table 2 & 3), the sensitivity, specificity and accuracy of thyroid FNAC in detecting malignancy ranges from 84-86%, 52-86% and 65-79% respectively. The determinant factor for such a wide range of sensitivity, specificity and accuracy may be how the cytopathologists classify 'suspicious' as well as false positive and negative samples. Present study showed 98% specificity, 75% sensitivity and efficacy of 92.8% for detecting neoplastic lesions, thereby indicating the clinical utility of aspiration in delineating neoplastic from non-neoplastic lesions^{2,5,10,11,19-23}.

CONCLUSION:

FNAC is a well-established technique for pre-operative investigation of STN. The technique is the noninvasive,

cost-effective and more efficient method of differentiating benign and malignant thyroid nodules.

Specificity of FNAC of STN was found to be high enough to reduce the number of surgical procedures and also monitor therapy. Guided biopsy is advised in case of small lesions to avoid giving false negatives. We therefore encourage our clinicians to embrace this investigative procedure in the management of our patients.

Table 1: Distribution of lesions on histopathology

Lesions on FNAC	Histopathology		
	Non-neoplastic lesions	Benign neoplastic lesions	Malignant neoplastic lesions
Non-neoplastic lesions (n=34)	27	6	1
Indeterminate (n=31)	4	26	1
Suspicious (n=3)	-	1	2
Malignant (n=2)	-	-	2
Total	31	33	6

Table 2: Comparison of findings of FNA with other studies

References	Indeterminate	Benign	Suspicious for malignancy	Malignant	Total
Present study	31	34	3	2	70
Bukhari et al ³	33	30	4	9	76
Flanagan et al ²¹	122	111	-	34	60
Mudasad et al ²²	4	94	20	6	266

Table 3: Comparison of present study with previous studies

Statistics	Present study	Bukhari et al ³	Chao et al ²³	Flanagan et al ²¹
Sensitivity	66.66%	85	86.1	81.7
Specificity	98.4%	90	59	56.4
Accuracy	95.71%	87	64.6	82
Clinical reliability	Reliable	Reliable	Reliable	Reliable

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