

Diagnostic Accuracy of FNAC in cases of Thyroid Nodules while taking histopathology as Gold Standard

MUHAMMAD AYUB¹, MUHAMMAD AFZAL SAJID², ZULFIQAR ALI SHAHID³

ABSTRACT

Aim: To find out the diagnostic accuracy of FNAC in cases of thyroid nodules while taking histopathology as gold standard.

Methods: This cross sectional study was conducted at Department of Surgery, Nishtar Hospital, Multan from August 2015 to February 2016. Total 100 patients with clinically palpable solitary thyroid nodules either male or female having age from 16-60 years were selected. Patient with confirmed diagnosis other than thyroid nodule and patients with advanced fixed tumor were excluded from the study.

Results: Mean age of the patients was 38±12.34 years. Male patients were 45(45%) and female patients were 55(55%). Sensitivity rate was 96.39% and specificity was 76.47%. Positive predictive value was 95.24% and negative predictive value was 81.25%. True positive was 80(80%), false positive was 4(4%), false negative 3 (3%) and true negative 13(13%).

Conclusion: The sensitivity, specificity and diagnostic accuracy of FNA were high, thus confirming the important role of fine needle aspiration cytology as the initial diagnostic utility in management of thyroid nodules. False negativity due to sampling error may be reduced by incorporating other clinical parameters as index of suspicion of malignancy and utilizing radiology-guided aspiration.

Keywords: Fine Needle Aspiration Cytology, Excision biopsy, Goiter.

INTRODUCTION

Palpable thyroid nodule is very common all globally. It occurs in about 4% to 7% of all the population and prevalence of nodules is 19% to 67%¹. Most of the thyroid nodules are asymptomatic, more common in women as compare to men². The incidence increases with advancing age, history of radiation exposure and diet containing goitrogenic material³. Most of the thyroid nodules are benign with only a fraction representing malignant disease which accounts for approximately 1.1% of all cancer annually⁴.

Neoplasms of thyroid have a wide spectrum of phenotype, which range from benign follicular lesions to violently anaplastic cancer⁵. Total thyroidectomy is initially preferable surgical approach for thyroid cancers⁶.

The large number of benign thyroid nodules relative to the small number of malignant ones creates a clinical dilemma how to manage patients with a detectable thyroid enlargement that statistically is more likely to be benign. Over the past three decades, FNA has developed as the most accurate and cost effective initial method for evaluating thyroid nodules⁷.

FNA biopsy of thyroid is a rapid, minimally invasive, and cost-effective first line procedure in the evaluation of thyroid nodule⁸. The main goal of thyroid FNA is to distinguish nodules that require surgery from those that do not, thereby decreasing the number of diagnostic surgical procedures⁹. This study was planned to evaluate the diagnostic accuracy of FNAC of solitary thyroid nodules in correlation with post-surgical histological findings.

MATERIAL AND METHODS

This cross sectional study was conducted at Department of Surgery, Nishtar Hospital, Multan from August 2015 to February 2016. Total 100 patients with clinically palpable solitary thyroid nodules either male or female having age from 16-60 years were selected. Patient with confirmed diagnosis other than thyroid nodule and patients with advanced fixed tumor were excluded from the study.

An approval was taken from institution review committee and written informed consent was taken from every patient.

After taking history and routine investigations FNAC and excision biopsy was performed and sample was sent to Pathology Department of Nishtar Hospital Multan for examination. Findings of the laboratory were noted on predesigned proforma.

Those cases which were found to be malignant by cytology as well as by histology were labelled as

¹Senior Registrar Surgery, Nishtar Hospital, Multan

²Emergency Surgeon, Nishtar Hospital Multan

³Assistant Professor Surgery, Nishtar Medical College Multan

Correspondence to Dr. Muhammad Ayub Email: drayub246@gmail.com

True Positive (TP). False positive (FP) were those diagnosed as malignant on cytology and turned to be benign on histology. True negative (TN) were benign on both cytology and histology. False negative (FN) were negative on cytology but positive for malignancy on histology.

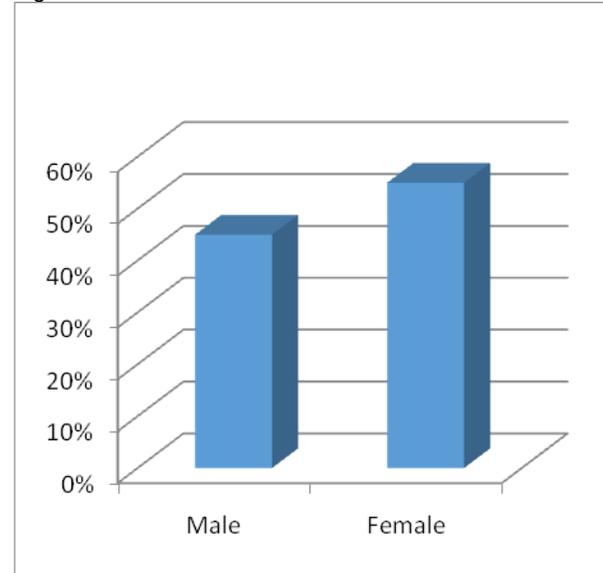
All the collected data was entered in SPSS version 17 and analyzed. Mean and SD was calculated for numerical data and frequencies were calculated for categorical data. 2X2 table was plotted to calculate sensitivity and specificity.

RESULT

Total 100 patients were selected for this study. Mean age of the patients was 38 ± 12.34 years. Male patients were 45 (45%) and female patients were 55(55%) (Fig. 1).

Total 9 (9%) patients found with low TSH levels and were considered hyperthyroid, 10 (10%) patients had increased TSH level and were considered hypothyroid and 81 (81%) patients had normal TSH levels and were considered euthyroid. Total 80 (80%) had benign cytological finding by FNA, which were also confirmed as benign by histopathological examination, representing true negative cases. There were 4 (4%) false negative cases which were diagnosed as benign upon FNA cytological but turned out to be papillary carcinoma after histopathological examination. Total 13 (13%) patients were diagnosed as malignant on FNA cytology as well as on histopathological examination, thus considered as true positive cases. There were 3 (3%) patients were false positive, which were cytologically diagnosed as papillary carcinoma but turned out to be goitre upon histopathological examination. Sensitivity rate was 96.39% and specificity was 76.47%. Positive predictive value was 95.24% and negative predictive value was 81.25%. True positive was 80 (80%), false positive was 4 (4%), false negative 3 (3%) and true negative 13 (13%). (Table 1)

Fig. 1: Gender distribution



DISCUSSION

Thyroid nodules occurred in about 4% to 7% of world population¹⁴. Women are more victim as compare to male. Excising all thyroid nodules is impractical, as most thyroid nodules are benign and thyroid surgery is not without risks. An effective screening test is therefore needed to identify patients who require surgery¹⁰.

In present study sensitivity rate was 96.39% and specificity was 76.47%. Positive predictive value was 95.24% and negative predictive value was 81.25%. True positive was 80(80%), false positive was 4(4%), false negative 3(3%) and true negative 13(13%).

Our results are comparable with the studies conducted by Sanggali *et al*, and Vojvodich *et al*, which reported sensitivity rates between 65% to 98%, specificity rates between 72% to 100%, and diagnostic accuracy rates between 70% to 90%¹¹⁻¹². A study conducted by Nurismah M *et al* on FNAC of the thyroid reported a sensitivity as 87.7% and specificity as 98.4%, which gives a diagnostic accuracy of 96.2%¹³. Results of our study are comparable with these studies. El Hag *et al* found sensitivity of 85.7%, specificity of 97.6%, with overall accuracy of 94%¹⁴. Another study conducted by Yeoh *et al* found 56% sensitivity, 90% specificity, and 79% diagnostic accuracy¹⁵. Our results are comparable with these studies.

In our study, false negative rate was 3%, which is in agreement with the other studies like Sanggali *et al*¹⁶ who reported false negative rate as 1–11%, and Nurismah *et al*¹³ reported false negative rates to be 3.2%. Our false positive cases was 4% which is in agreement to previous rates calculated by Nurismah

Table 1: Cytological and histopathological diagnoses

Results of FNAC	Results of histopathology		Total
	Positive (%)	Negative (%)	
Positive	True positive(a) 80(80%)	False positive (b) 4 (4%)	a + b 84(84%)
Negative	False negative(c) 3(3%)	True negative (d) 13 (13%)	c + d 16(16%)
Total	A + c 83(83%)	b + d 17 (17%)	n 100

Sensitivity = a / (a + c) x 100 = 96.39 %
 Specificity = d / (d + b) x 100 = 76.47 %
 Positive predictive value = a / (a + b) x 100 = 95.24%
 Negative predictive value = d / (d + c) x 100 = 81.25%

*et al*¹³ and Suresh *et al*¹⁷, who found false positive rates to be 6.6% and 0.3–10% respectively.

Positive predictive value (PPV) in our study 95.24% which was comparable with the study of Yeoh¹⁵ who reported PPV as 74%. Negative predictive value (NPV) in our study was 81.25%, which was also comparable with the study of Yeoh as rate of 80%¹⁵.

CONCLUSION

The sensitivity, specificity and diagnostic accuracy of FNA were high, thus confirming the important role of fine needle aspiration cytology as the initial diagnostic utility in management of thyroid nodules. False negativity due to sampling error may be reduced by incorporating other clinical parameters as index of suspicion of malignancy and utilising radiology-guided aspiration.

REFERENCES

1. Khan I, Naz S, Akhter ZM, Aziz N. Diagnostic accuracy of fine needle aspiration of thyroid nodule verses biopsy in thyroid lesions. *J Ayub Med Coll Abbottabad*. 2016;22(4):179-81.
2. Bomeli SR, LeBeau SO, Ferris RL. Evaluation of a thyroid nodule. *Otolaryngol Clin North Am*. 2010 Apr;43(2):229–38.
3. Amrikachi M, Ramzy I, Rubinfeld S, Wheeler TM. Accuracy of fine-needle aspiration of thyroid. *Arch Pathol Lab Med* 2001;125:484–8.
4. DeLellis RA, Lloyd RV, Heitz PU, Eng C, World Health Organization Classification of Tumors: Tumors of Endocrine Organs. Lyon: IARC Press, 2004.p. 26–7
5. Schröder S, Wodzynski A, Padberg B. [Cytokeratin expression of benign and malignant epithelial thyroid gland tumors. An immunohistologic study of 154 neoplasms using 8 different monoclonal cytokeratin antibodies]. *Pathologe*. 1996 Nov;17(6):425–32.
6. Abdul-Jaber HB, Lynn J. The surgical management of thyroid cancer. *Nucl Med Commun* 2004;25:869–72.
7. Yang J, Schnadig V, Logrono R, Wasserman PG. Fine-needle aspiration of thyroid nodules: a study of 4703 patients with histologic and clinical correlations. *Cancer Cytopathol* 2007;111:306–15.
8. Baloch MN, Ali S, Ansari MA, Maher M. contribution of fine needle aspiration cytology (FNAC) in the diagnosis of malignant thyroid nodules. *Pak J Surg*. 2008;24(1):19–21.
9. Sinna EA, Ezzat N. Diagnostic accuracy of fine needle aspiration cytology in thyroid lesions. *Journal of the Egyptian National Cancer Institute*. 2012 Jun;24(2):63–70.
10. Popoveniuc G, Jonklaas J. Thyroid Nodules. *Med Clin North Am*. 2012 Mar;96(2):329–49.
11. Sanggali G, Serio C, Zampatti M, Lomuscio BG. Fine needle aspiration cytology of thyroid: a comparison of 5469 cytological and final histological diagnosis. *Cytopathology*. 2006;17:245–50.
12. Vojvodich SM, Ballagh RH, Howard HC. Accuracy of fine needle aspiration in the preoperative diagnosis of thyroid neoplasia. *J Otolaryngol* 1994;23:360–5.
13. Nurismah MI, Sharifah NA, Usama AE, Rohaizak M, Naqiyah I, Jasmi A. Fine needle aspiration cytology of thyroid: a cytohistopathological study of 361 cases in hospital university Kebangsaan Malaysia. *Med Health* 2007;2:58–65.
14. El Hag IA, Kollur SM, Chiedozi CL. The role of FNA in initial management of thyroid lesions:7 year experience in a district general hospital. *Cytopathology* 2003;14:126–30.
15. Yeoh GPS, Chan KW. The diagnostic value of fine needle aspiration cytology in the assessment of thyroid nodules: a retrospective 5 year analysis. *Hong Kong Med J* 1999;5:140–4.
16. Sanggali G, Serio C, Zampatti M, Lomuscio BG. Fine needle aspiration cytology of thyroid: a comparison of 5469 cytological and final histological diagnosis. *Cytopathology*. 2006;17:245–50.
17. Suresh R, Shenovi M, Nisha SN, Roque GWP, Suzette M. Role of fine needle aspiration cytology as the initial modality in the investigation of thyroid lesions. *Acta Cytologica* 1995;39:898–904.