



Correlation between Cytology and Histology of Solitary Thyroid Nodule: Our Institutional Experience

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Abstract

Introduction: Thyroid swelling is one of the most common disease presenting to otorhinolaryngology out patient. Fine needle aspiration cytology is key point in planning the surgical management. The discrepancy between cytology and histology reported in wide range depending upon centres. We planned to conduct this study with aim of knowing the sensitivity of cytology which can guide the need of surgical or observational treatment. **Methods:** Our study is prospective enrolling the patients with thyroid swelling who underwent surgical treatment between 1st October 2020 to 11th November 2021. Clinical, cytological and histological parameters were recorded. Accounting histology as gold standard, sensitivity, specificity and accuracy of fine needle cytology were calculated. The correlation was evaluated by chi square test. The p value of ≤ 0.05 was considered significant. **Results:** The most common age group reporting was 20-40 years accounting for 68.6% of cases with the female predominance (92.2%). The accuracy of fine needle cytology in detecting non neoplastic, neoplastic benign and neoplastic malignant lesion were 96.0%, 96.0% and 100.0 % respectively. **Conclusions:** Fine needle cytology is good tool for deciding surgical management for thyroid nodule and recommended for all cases.

Keywords: Thyroid, Cytology, Histology, Neoplasm, Benign, Thyroidectomy.

Introduction:

Thyroid swelling is one of the most common disease presenting to otorhinolaryngology out patient. The prevalence of thyroid nodule is approx. 4-10 % in general adult population^{1,2}. Clinical history and examination, thyroid function test, ultrasonography of neck and fine needle aspiration cytology are commonly performed for evaluation of thyroid nodule^{3,4}. Non neoplastic swelling is more common than neoplastic^{5,6}. Nepal comes under endemic region for goitre due to iodine deficiency and so need to differentiate between malignant and non-malignant lesions. As per ATA guidelines, small neoplastic nodule can be kept on observation

without surgical treatment and so avoidance of its potential complications⁷.

FNAC is key point for surgical management. Since thyroid is highly vascular, small bore needle aspiration is preferred. Unstained smear is visualized for tissue fragments and colloid initially followed by stained examination. Papanicolaou and H&E stains help in characterization of nuclear features whereas Romanowsky stains better define cytoplasmic characteristics⁸. The discrepancy between cytology and histology reported in wide range depending upon centres. We planned to conduct this study with aim of knowing the sensitivity of cytology which can guide the need of surgical or observational treatment.

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Methods:

Our study is prospective and conducted after

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obtaining institute ethical approval (IRC-NMCTH: 373/2020). We have enrolled the patients with thyroid swelling who underwent surgical treatment in our centre and had given consent for the study between 1st October 2020 to 11th November 2021. All patients were evaluated by history, clinical examination, thyroid function test, ultrasonography of neck and fine needle aspiration cytology. Clinical, cytological and histological parameters were recorded. Cytology and histological examination were performed from same pathology lab and by same consultant pathologist. Since all our patients have visible neck lump, conventional method of needle aspiration was performed except in 2 patients in which additional ultrasonic guided aspiration required in view of indeterminate cytology in first attempt. Final report of cytology was made after H&E staining. Accounting histology as gold standard, sensitivity, specificity and accuracy of fine needle cytology were calculated. The correlation was evaluated by chi square test. The statistical analysis was performed using SPSS version 16.0. The p value of ≤ 0.05 was considered significant.

Results:

The most common age group reporting was 20-40 years accounting for 68.6% of cases with the majority being female (92.2%). Elderly age group above 60 years was confined to 5.9%. The majority of patients (51.0%) with the visible neck lump had consulted in the duration of 1 to 3 months. (Table 1)

Table 1: Clinical parameters

Parameters		Number (n)	Percentage (%)
Age group (in years)	20-30	17	33.3
	>30-40	18	35.6
	>40 -50	8	15.7
	>50 - 60	5	9.8
	>60	3	5.9
Sex	Male	4	7.8
	Female	47	92.2
Duration of neck swelling presentation (in months)	< 1	13	25.5
	1-3	26	51.0
	>3	12	23.5

One from each of non-neoplastic and benign lesion group, it turned out to be malignant. So, overall discrepancy was noted in 8% cases. Overall cytological and histological correlation was found to be significant by chi square test ($p < 0.001$). (Table 2)

Table 2 :Cytological and histological parameters correlation

Parameters	Cytological	Histological	
Non neoplastic	25	24	Chi square test P <0.001
Neoplastic – benign	25	24	
Neoplastic – malignant	1	3	

Accounting histopathology as gold standard, the accuracy of fine needle cytology in detecting non neoplastic, neoplastic benign and neoplastic malignant lesion were 96.0%, 96.0% and 100.0 % respectively. (Table 3)

Table 3: Sensitivity,specificity and Accuracy of Fine needle aspiration

Parameters	For non-neoplastic lesion	For neoplastic benign lesion	For neoplastic malignant lesion
Sensitivity	96.0%	96.0%	100.0%
Specificity	96.0%	96.0%	100.0%
Accuracy	96.0%	96.0%	100.0%

Discussion:

Cytological evaluation is the most commonly pursued for evaluation of thyroid nodule because it has many advantages being easy, safe, inexpensive and rapid procedure^{9,10}. Although uniform reporting system called as Bethesda system was incorporated, there is high chance of observer variation in reporting especially in the indeterminate cases¹¹. There is also some limitation of it because of possibility of false positive and negative result^{12,13}. The main aim of fine needle cytology is to differentiate neoplastic versus non neoplastic nodule because the former

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category requires surgical treatment while later category can be kept for observation⁷.

Palpatory method is most commonly performed technique for FNAC. Since all patients had presented with visible neck swelling, the same technique was applied in our cases also. The most common age group noticed is 20-40 years of female (68.6%). Similar prevalence was seen in previously published literature from Nepal¹⁴⁻¹⁶.

Neck lump is the most common manifestation of thyroid nodule due to which patients visit the concerned specialist with the fear of cancer. The time duration between onset of neck lump and visiting the doctor varies. In our cases, 51.0% reported between 1 to 3 months duration interval. The delay was because of ongoing COVID 19 pandemic and patient not having any other symptom apart from it.

Forty nine percentage of the cases reported by fine needle cytology as non-neoplastic underwent surgical management in view of cosmesis, fear of cancer and unsuitable for regular follow up. Rest 51% were neoplastic lesion and thus underwent surgical management. Accounting histopathology as gold standard, one from each of non-neoplastic and benign lesion group, turned out to be malignant. Thus, in our cases, accuracy of fine needle cytology in detecting non neoplastic, neoplastic benign and neoplastic malignant lesion were 96.0%, 96.0% and 100.0 % respectively which is comparable to the previous studies from Nepal and abroad 14-20. (Table 4)

Table 4 : Present study comparisons to published literatures

Literatures	Sensitivity	Specificity	Accuracy
Our study	96.0 %	96.0 %	96.0 %
Hirachand et al, 2013	96.4 %	94.4 %	95.7%
Bhatt et el , 2012	85.7 %	92.3%	90.0 %
Bista et al, 2011	70.0 %	97.5%	92.1%
Bagga et al, 2010	66.0 %	100%	96.2%
Sengupta et al, 2011	90.0 %	100%	98.8%

Sharma et al, 2017	84.0 %	100%	90.0%
Babu et al, 2016	90.0 %	100%	94.0%

Our institute is the referral tertiary care hospital in eastern Nepal and fulfils the criteria of high volume centre for thyroid surgery²¹. Since FNAC has limitation of inter- observer discrepancy, high volume centre is one of the measure to overcome this to some extent. We conducted this study with aim of knowing the sensitivity of cytology so that it can guide the need of surgical or observational treatment and thus avoidance of morbidities related to surgery. More number of samples with multicentric study will aid to our day to day practice in thyroid surgery.

Conclusions:

Fine needle cytology is good tool for deciding surgical management for thyroid nodule and recommended for all cases, although discrepancy exists to some extent. So, regular follow up is needed. Otherwise, surgical excision biopsy is alternative option to overcome it in clinically or radiologically suspected cases.

List of abbreviations

- FNAC: Fine Needle Aspiration Cytology
- HPE: Histo- Pathology Examination
- ATA: American Thyroid Association
- Ethics approval and consent to participate

Our study was conducted after obtaining institute ethical approval (IRC-NMCTH: 373/2020), Nobel Medical College and Teaching Hospital. Participants were explained about the research detail, its significance, the benefit and harm in Nepali language before obtaining the consent. A statement indicating that the participants has understood all the information and is willing to participate voluntarily was obtained. The confidentiality of participants were assured and not mentioned anywhere.

Competing interests

The authors declare that they have no competing interests.

Authors' contributions

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RT- Conceptualized, collected data, analyzed and wrote the manuscript. SKT-Involved in the study from the beginning and critically reviewed the manuscript.

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References:

1. Singer PA, Cooper DS, Daniels GH, et al. Treatment guidelines for patients with thyroid nodules and well-differentiated thyroid cancer. American Thyroid Association. Arch Intern Med. 1996;156(19):2165–72.
2. Mazzaferri EL. Management of a solitary thyroid nodule. N Engl J Med. 1993;328(8):5539.
3. Singer PA. Evaluation and management of the solitary thyroid nodule. Otolaryngol Clin North Am. 1996;29(4):577–91
4. Bomeli SR, LeBeau SO, Ferris RL. Evaluation of a thyroid nodule. Otolaryngol Clin North Am. 2010;43(2):229-vii.
5. Padmawar MR, Kher K, Kakade A. Clinicopathological study of multinodular goiter at AVBRH. Int J Biomed Adv Res. 2014;05(01):10–13.
6. Hariprasad S, Srinivas T. Clinicopathological study of thyroid swellings - 2 year prospective study. Indian J Basic Appl Med Res. 2017;6(3):152–160
7. Haugen BR, Alexander EK, Bible KC, et al. 2015 American Thyroid Association Management Guidelines for Adult Patients with Thyroid Nodules and Differentiated Thyroid Cancer: The American Thyroid Association Guidelines Task Force on Thyroid Nodules and Differentiated Thyroid Cancer. Thyroid. 2016;26(1):1-133.
8. Shipra Agarwal, Deepali Jain. Thyroid Cytology in India: Contemporary Review and Meta-analysis. Journal of Pathology and Translational Medicine. 2017;51(6):533-547.
9. Castro MR, Gharib H. Thyroid fine-needle aspiration biopsy: progress, practice, and pitfalls. Endocr Pract. 2003;9(2):128–36.
10. Gharib H, Goellner JR. Fine-needle aspiration biopsy of the thyroid: an appraisal. Ann Intern Med. 1993;118(4):282–9.
11. Edmund S. Cibas and Syed Z. Ali. Thyroid, 2017:1341-1346.
12. Hajmanoochehri F, Rabiee E. FNAC accuracy in diagnosis of thyroid neoplasms considering all diagnostic categories of the Bethesda reporting system: A single-institute experience. J Cytol. 2015;32(4):238-243.
13. Muratli A, Erdogan N, Sevim S, Unal I, Akyuz S. Diagnostic efficacy and importance of fine-needle aspiration cytology of thyroid nodules. J Cytol. 2014;31:73–8.
14. Bista M, KC Toran, Regmi D, Maharjan M, Kafle P, Shrestha S. Diagnostic accuracy of fine needle aspiration cytology in thyroid swellings. J Nepal Health Res Counc 2011;9:14-6.
15. Bhatta S, Makaju R, Mohammad A. Role of fine needle aspiration cytology in the diagnosis of thyroid lesions. Journal of Pathology of Nepal .2012; 2: 186 -188
16. Hirachand S, Maharjan M, Lakhey M, Thapa R, Kafle S. Accuracy of fine needle aspiration cytology in diagnosis of thyroid swelling. Journal of Pathology of Nepal ,2013; 3: 433-436.
17. Bagga PK, Mahajan NC. Fine needle aspiration cytology of thyroid swellings: how useful and accurate is it? Indian J Cancer. 2010;47(4):437-42.
18. Sengupta A, Pal R, Kar S, Zaman FA, Sengupta S, Pal S. Fine needle aspiration cytology as the primary diagnostic tool in thyroid enlargement. J Nat Sci Biol Med. 2011;2(1):113-118.
19. Sharma R, Verma N, Kaushal V et al. Diagnostic accuracy of fine needle aspiration cytology of thyroid gland lesions: A study of 200 cases in Himalayan belt. J Can Res Ther 2017,13:451-55
20. Babu SB, Raju R, Radhakrishnan S. Correlation of fine needle aspiration cytology with histopathology in the diagnosis of thyroid swellings. Int Surg J 2016; 3: 1437-41.
21. Melfa G, Porello C, Cocorullo G, et al. Surgeon volume and hospital volume in endocrine neck surgery: how many procedures are needed for reaching a safety level and acceptable costs? A systematic narrative review. G Chir. 2018;39(1):5-11.