International Journal of Research in Medical Sciences
Chandra S et al. Int J Res Med Sci. 2016 Oct;4(10):4552-4556
www.msjonline.org
pISSN 2320-6071 | eISSN 2320-6012

DOI: http://dx.doi.org/10.18203/2320-6012.ijrms20163328

Research Article

Role of fine needle aspiration cytology and cytohistopathological co-relation in thyroid lesions: experience at a tertiary care centre of North India

Smita Chandra[1]*, Divya Mahajan[1], Harish Chandra[2]

[1]Department of Pathology, Himalayan Institute of Medical Sciences, Dehradun, Uttarakhand, India
[2]Department of Pathology, All India Institute of Medical Sciences, Rishikesh, Uttarakhand, India

Received: 11 August 2016
Revised: 11 August 2016
Accepted: 07 September 2016

***Correspondence:**
Dr. Smita Chandra,
E-mail: smita_harish@yahoo.com

ABSTRACT

Background: Fine needle aspiration cytology is considered to be simple and cost effective technique for diagnosis of thyroid lesions. However the common limitations which may be encountered in FNAC may be associated with sampling error, dual pathology, cystic change or misinterpretation of morphology. The present study was therefore conducted to study the role of FNAC in diagnosis of thyroid lesions and to study the diagnostic pitfalls which may be encountered that limit the diagnosis of thyroid lesions.
Methods: A retrospective study was conducted which included all the cases of thyroid lesions in which FNAC was done either directly or under image guidance over a period of five years. The cytomorphological diagnosis was correlated with histopathology to assess the diagnostic accuracy of FNAC in diagnosis of thyroid lesions.
Results: Colloid goitre was the most common benign thyroid lesion while papillary carcinoma was the most common carcinoma constituting 50.2% and 5.2% of total cases. The maximum cyto-histopathological discordance was observed in cases of autoimmune thyroiditis (38%) and papillary carcinoma was most common lesion which was underdiagnosed on FNAC.
Conclusions: The study concludes that although FNAC is safe, cost effective and sensitive technique for diagnosis of thyroid lesions but vigilant cyto-morphological interpretation in association with skilful aspiration and clinic-radiological co-relation is essential to avoid diagnostic pitfalls. This is even more important in cases showing focal neoplastic pathology or presence of dual pathology. Repeat image guided FNAC with clinical follow up is recommended in cases with strong clinical suspicion of malignancy.

Keywords: Cyto-histopathological correlation, Fine needle aspiration cytology, Thyroid

INTRODUCTION

Thyroid nodules which have an incidence of 4-5% in general population are mostly benign in nature with carcinoma occurring in 5-20% of cases.[1,2] Although various diagnostic modalities including radioisotope scanning, ultrasonography along with thyroid function tests have been utilized for diagnosis of thyroid lesions but fine needle aspiration cytology (FNAC) is considered to be an accurate, cost effective technique for diagnosis of thyroid lesions.[3,4] Many large studies have observed that sensitivity and specificity of thyroid FNAC ranges from 80 to 100% and the common limitations may be encountered due to sampling error, associated cystic change or misinterpretation of morphology on smears.[5,6]

The present study was therefore conducted to study the role of FNAC in diagnosis of thyroid lesions and to co-relate it with histopathology. It was also intended to study the diagnostic pitfalls and sources of errors which may be

encountered on FNAC that limit the diagnosis of thyroid lesions.

METHODS

A retrospective study was conducted in the cytopathology section of the pathology department of the institute which included all the cases of thyroid lesions in which FNAC was done either directly or under image guidance over a period of five years (September 2010 to May 2015).

The air dried and wet fixed conventional cytological smears were thoroughly examined for cytomorphological diagnoses which were later correlated with histopathology to assess the diagnostic accuracy of FNAC in diagnosis of thyroid lesions. The causes of cyto-histopathological discordance were also evaluated in the study.

RESULTS

Thyroid FNAC was performed in total 830 patients over a period of five years with mean age of 44 years and male female ratio of 1: 4.3. The direct FNAC was performed in 91.17% cases while ultrasonographically guided was done in in 8.8% of total cases. Out of total patients, cytohistopathological correlation was available in 170 patients. Table 1 shows the broad categorization of thyroid lesions and shows that benign lesions constituted maximum number of cases (78.5% of total cases).

Table 1: Broad categorisation of thyroid lesions.

Types	Categories	Number of cases (%)
C1	Inadequate	73 (8.79%)
C2	Non-neoplastic / Benign	652 (78.5%)
C3	Atypical	10 (1.2%)
C4	Neoplastic	95 (11.4%)

Table 2: Cytological diagnosis on thyroid FNAC.

Cytological diagnosis	Number of cases (%)
Inadequate	73 (8.7%)
Colloid goitre	417 (50.24%)
Autoimmune thyroiditis	137 (16.5%)
Hyperplasia	99 (11.92%)
Atypical cells	9 (1.0%)
Follicular neoplasm	21 (2.5%)
Suspicious of malignancy	16 (1.92%)
Papillary carcinoma	43 (5.18%)
Anaplastic carcinoma	03 (0.3%)
Medullary carcinoma	03 (0.3%)
Poorly differentiated malignancy	08 (0.9%)
Miscellaneous (spindle cell carcinoma)	01 (0.1%)
Total	830

Table 3: Cyto-histopathological discordance in diagnosis of thyroid lesions.

Final diagnosis	Cytological diagnosis	Histological diagnosis	Discordant cases (%)	Diagnostic accuracy of cytology (%)
Colloid goitre	83	78	05 (6.02%)	93.9
Autoimmune thyroiditis	21	13	08 (38%)	61.9
Hyperplasia	14	10	04 (28.5%)	71.42
Atypical cells	03	01	02 (66.6%)	33.3
Follicular neoplasm	08	08	00	100
Suspicious of malignancy	06	02	04 (66.6%)	33.3
Papillary carcinoma	17	17	00	100
Anaplastic carcinoma	01	01	00	100
Medullary carcinoma	02	02	00	100
Poorly differentiated malignancy	02	01	1 (50%)	50
Miscellaneous (spindle cell malignancy)	01	01	00	100
Inadequate	12	00	12 (100%)	
Total	170	134	22 (13.9%)	84.8%

Table 2 shows the various cytological diagnoses on thyroid FNAC. 8.7% cases were considered inadequate on FNAC while colloid goitre was the most common diagnosis. Papillary carcinoma (5.18%) was the most common neoplasm observed in the study. Table 3 shows cyto-histopathological discordance in diagnosis of thyroid lesions and it showed that maximum discordance (38%) was observed in cases of autoimmune thyroiditis.

Table 4 shows histopathological diagnosis in cases which showed discordance with cytological diagnosis. Papillary carcinoma was the most common lesion which was underdiagnosed on FNAC.

DISCUSSION

FNAC has a crucial role in preoperative investigation of patients with thyroid swelling as it is simple, safe and cost-effective diagnostic method with high specificity and accuracy. In the present study, the most common age group with thyroid nodules was in third and fourth decade with female preponderance which is similar to other studies.[4,7]

8.79% of total cases (73/830) were considered inadequate on first FNAC and out of these 23 cases were subjected to second aspirate either directly or under image guidance. Out of this cytology was able to provide definite diagnosis in 15 cases while 8 cases were again considered inadequate on aspiration.

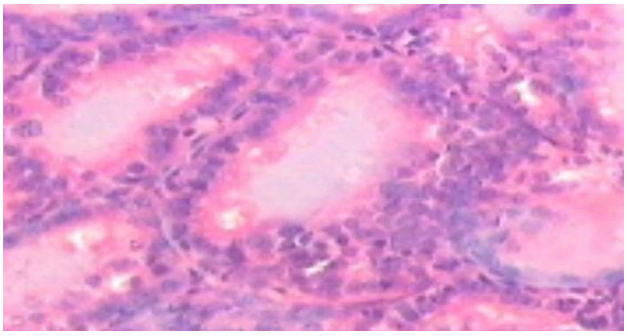

Figure 1: Section from thyroid showing variable sized follicles filled with colloid in case of colloid goiter (hematoxylin and eosin, X40).

Out of the total inadequate cases, 12 cases underwent histopathological examination in the light of strong clinical and radiological suspicion of malignancy and 32 cases were lost to follow up as they did not turn up for repeat FNAC or histopathological examination.

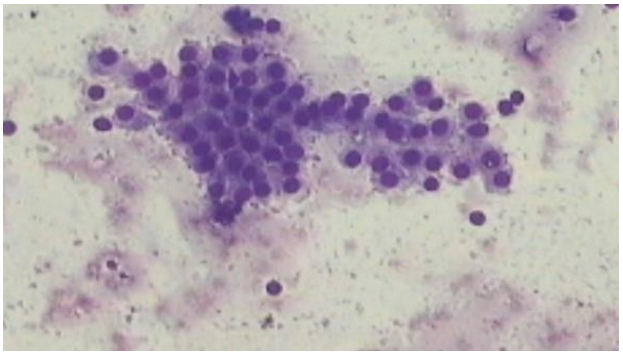

Figure 2: FNAC thyroid of same case showing monolayered sheet of benign follicular epithelial cells in background of colloid (May Grunwald Giemsa, X40).

The authors therefore suggest that cases which are inadequate on aspiration must be either subjected to repeat FNAC or histopathological examination if there is strong clinic-radiological suspicion of any neoplasm. Benign thyroid lesions were the most common thyroid lesions diagnosed in the study with colloid goitre being the commonest diagnosis (Figure 1 and 2).

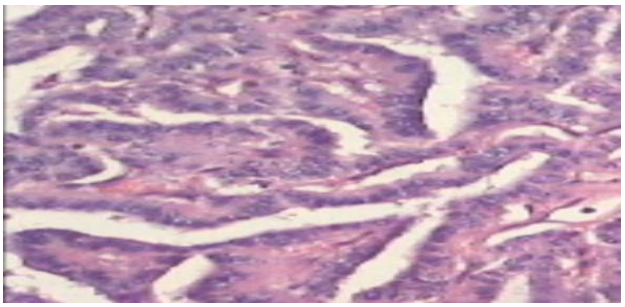

Figure 3: Section from thyroid shows papillae lined by tall columnar cells showing nuclear clearing along with few mitotic figures in case of papillary carcinoma (hematoxylin and eosin, X40).

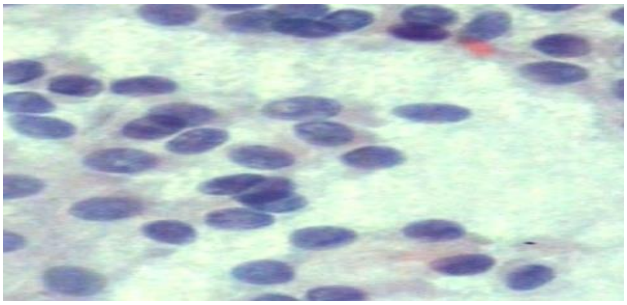

Figure 4: FNAC thyroid of same case showing cells with intranuclear inclusions and few with nuclear grooving in background of scant colloid (papanicolaou, X40)

Yang et al and Wu et al have also observed similar findings in their study.[6,8] Papillary carcinoma was the most common carcinoma of thyroid in the present study which is consistent with findings of Bogohain et al (Figure 3 and 4).[9]

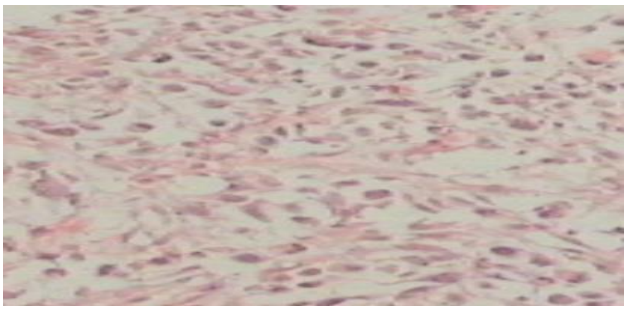

Figure 5: Section from thyroid shows sheets and clusters of pleomorphic cells with increased mitotic activity in case of anaplastic carcinoma (hematoxylin and eosin, X40).

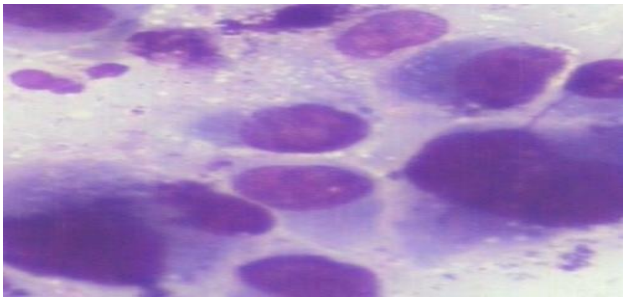

Figure 6: FNAC thyroid of same case showing cellular smears with large pleomorphic cells having abundant dense cytoplasm and nuclei with coarse chromatin with evidence of mitosis (May Grunwald Giemsa, X40).

The accuracy of cytology for diagnosis of various thyroid lesions in the present study was 84.8% which is either comparable or slightly lower than other studies.[4,9] Eight cases were misdiagnosed as autoimmune thyroiditis on FNAC and the authors suggest that presence of lymphocytes should be interpreted with caution in thyroid smears so as to avoid missing of Non- Hodgkin's lymphoma as well as to prevent over diagnosis due to increased lymphocytes in association with malignancy.

Fourteen false negative cases were observed in the study and the authors suggest that vigilant examination of all the smears is essential to avoid missing of any finding which may raise suspicion of malignancy (Figure 5 and 6).

The missing of malignancy may also result due to error in sampling or association of dual pathology. The dual pathology may be association of colloid goitre or hyperplasia with malignancy. This may be avoided by multiple aspirates from single lesion in the light of clinical and radiological findings or by undergoing image guided FNAC.

A total of 10 cases of papillary carcinoma were missed on FNAC and were considered as inadequate or misdiagnosed as colloid goitre, autoimmune thyroiditis and hyperplasia in the study. This misdiagnosis may be due to associated cystic changes and dual pathology or misinterpretation of cytological features of follicular variant of papillary carcinoma as hyperplasia.

Cystic changes in thyroid lesions are a common diagnostic pitfall faced during cytological diagnosis. Therefore, authors suggest that aspiration from multiple sites and from solid areas are advisable. Moreover in such cases, ultrasound guided FNAC may be helpful to increase the overall accuracy of cytology.

Wu HH et al also observed in their study that most commonly missed lesion on thyroid FNAC was follicular variant of papillary carcinoma which was due to presence of abundant colloid, monolayered sheets and paucity of nuclear features of papillary carcinoma.[8] In addition, patients with benign cytological findings but having strong clinical suspicion of neoplasm should have either close clinical follow- up or histopathological examination so as to avoid false negative diagnosis on cytology.

CONCLUSION

The study concludes that although FNAC is safe, cost effective and sensitive technique for diagnosis of thyroid lesions but vigilant cyto-morphological interpretation in association with skilful aspiration and clinic-radiological co-relation is essential to avoid diagnostic pitfalls. This is even more important in cases showing focal neoplastic pathology or presence of dual pathology. Repeat image guided FNAC with clinical follow up is recommended in cases with strong clinical suspicion of malignancy.

Funding: No funding sources
Conflict of interest: None declared
Ethical approval: The study was approved by the Institutional Ethics Committee

REFERENCES

1. Gharib H, Papini E, Valcavi R, Baskin HJ, Crescenezi A, Dottorini ME, et al. American Association of Clinical Endocrinologists and Associazione Medici Endocrinologi medical guidelines for clinical practice for the diagnosis and management of thyroid nodules. Endocr Pract. 2006;12:63-102.
2. Sarunya K, Kornkanok S, Pongak M. The study of thyroid lesions and the correlation between histomorphological and cytological findings at Maharaj Nakorn Chiang Mai Hospital between 2003- 2007. Chiang Mai Med J. 2010;49:105-10.
3. Handa U, Garg S, Mohan H, Nagarkar N. Role of the fine needle aspiration cytology in diagnosis and management of thyroid lesions: A study of 434 patients. J Cytol. 2008;25:13-7.
4. Bamanikar S, Soraisham P, Jadhav S, Kumar H, Pradeep Jhadav P, Bamanikar A. Cyto-histology and clinical correlation of thyroid gland lesions: A 3 year study in a tertiary hospital. Clin Cancer Investig J. 2014;3:208-12.
5. Amrikachi M, Ramzy I, Rubenfeld S, Wheeler TM. Accuracy of fine needle aspiration of thyroid-A review of 6226 cases and correlation with surgical and clinical outcome. Arch Pathol Lab Med. 2001;125:484-8.
6. 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.
7. Kapila K, Qadan L, Ali RH, Jaragh M, George SS, Haji BE. The Bethesda system for reporting thyroid fine needle aspiration cytology: A Kuwaiti experience-A cytohistopathological study of 374 cases. 2015;59:133-8.

8. Wu HH, Jones JN, Osman J. Fine needle aspiration cytology of the thyroid: Ten years' experience in a community teaching hospital. Diagn Cytopathol. 2006;34:93-6.
9. Borgohain R, Lal RK, Chatterjee P, Brahma N, Khanna S. A Study of Cyto-histological correlation in the diagnosis of thyroid swelling. J Den Med Sci. 2014;13:46-9.

Cite this article as: Chandra S, Mahajan D, Chandra H, Role of fine needle aspiration cytology and cytohistopathological co-relation in thyroid lesions: experience at a tertiary care centre of North India. Int J Res Med Sci 2016;4:4552-6.