Utility of Bethesda System for Reporting Thyroid Fine Needle Aspirates

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ABSTRACT

The present study was a two year prospective study of FNAC of total 158 palpable thyroid lesions, reported according to The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC). Out of 158 cases, 36 patients underwent surgical excision and cyto- histopathological correlation was done in these cases. Majority of the patients were females, with a ratio of female to male as 8.9:1. The duration of the palpable thyroid swelling in the present study ranged from less than 1 month period to more than 5 years. Size of thyroid swelling varied from as small as 1 cm to as large as 18 cm in diameter. The procedure was done by both aspiration and non-aspiration techniques and any significant difference in terms of the yield of material by either of the method, was not observed in the present study. TBSRTC is an excellent reporting system, as it showed specificity of 100 % in the present study, which helped to diagnose benign cases correctly and to avoid unnecessary surgery.

INTRODUCTION

Thyroid gland is the largest endocrine gland and due to its superficial location is the only one amenable to direct physical examination and fine needle aspiration. Thyroid enlargement is very common, especially in Indians, more those living in hilly and mountain areas. It is neither indicated nor justifiable to operate on every patient with a thyroid mass, as incidence of malignancy is quite low, compared with the overall incidence of thyroid swellings (Kaur et al., 2002). Often it is difficult to make an accurate diagnosis by clinical evaluation alone. Hence, Fine Needle Aspiration Cytology (FNAC) of such lesions along with clinical evaluation is emphasized in order to make an accurate diagnosis. As all palpable lesions can be assessed by FNAC technique, early diagnosis is often possible (Orell et al., 2011). There have been few studies validating utility, standardization and reproducibility of the TBSRTC in identifying thyroid lesions (Hag et al., 2003). We receive many patients with palpable thyroid lesions for FNAC in our Pathology department. Hence, the present study “Utility of Bethesda system for reporting thyroid fine needle aspirates: a clinicocytological study with histological correlation” is undertaken.

Aim and Objectives

Aim

To evaluate usefulness of Bethesda system for reporting thyroid fine needle aspirates.

Objectives

To perform fine needle aspiration of various palpable thyroid lesions (USG guided as well as non-guided) and to study the cytological findings. To correlate thyroid FNAC results with histopathological diagnosis wherever available and with clinical outcome in cases where surgical excision is not done.

Review of Literature

Thyroid gland is enclosed by a dense connective tissue capsule and fibrous septa extend from capsule
into the substance of gland and dividing into lobules. Each lobule is made up of an aggregate of 20-40 follicles. Each follicle is morphological and functional unit of thyroid. Each follicle measures about 200 μm in diameter with considerable variation in size. Each follicle is lined by a layer of low cuboidal to flattened epithelium depending upon the activity of the follicle. The cytoplasm of each cell is acidophilic or amphophilic and nuclei are round to oval/uniform and nucleoli are not prominent. The follicle is filled with colloid, the quantity of colloid changes according to functional activity of gland. The colloid is scanty in hyper functioning gland and dense abundant, homogenous and intensely eosinophilic in hypoactive glands. In adults some of the follicular cells transform to large cells with deep abundant eosinophilic granular cytoplasm referred to as Hurthle cells, oxyphilic cells or oncocytes. Ultrastructurally these granules are due to accumulation of mitochondria. The second minor endocrine component of the gland is represented by para follicular cells, also called as "C" cells. These cells appear larger and paler than follicular cells. These are polygonal or spindle shaped cells containing granular or foamy cytoplasm with large eccentric nucleus with distinct nucleoli.

The most common thyroid problem faced by the surgeon and the pathologist is evaluation of patient with thyroid nodule (Mazzaferri, 1992). The diagnostic approach to patient with thyroid nodule includes clinical history, physical examination, fine needle aspiration cytology, radiological imaging the most common being Ultrasonography (USG), thyroid function tests and other investigations like antithyroid antibodies and tumor markers.

The first report of the needle aspiration can be traced in the literature way back in 1847, where Kun has cited the description of the procedure as follows "on plunging into the tumors with an exploring needle having at its extremity a small depression with cutting edges, one can extract a minute portion of tissue and a microscopic examination can be practiced" (Frable, 1989).

It was in the 1970’s that the clinicians started utilization of newer imaging modalities like Ultrasonography according to Holmes HH et al (Holm et al., 1973) and later on computerized tomography according to Haaga JR et al (Haaga, 2005) for the purpose of aspiration. It was found that these newer methods not only demonstrated the disease process far more accurately than before, but also allowed more precise localization of aspiration needle even in previously inaccessible lesions (Langlois et al., 1992). Renshaw AA and Krane JF (2013) (Renshaw and Krane, 2013) proposed that the benign category in Bethesda system for reporting thyroid fine needle aspirate to be split into two: an outright benign category without any qualification and a second category in which a benign diagnosis is favoured but follow-up is mandatory and that such a split will help the cytopathologists, clinicians and the patients.

In a patient with diffuse goiter, where cytological smears show moderate cellularity with colloid in the background a report of colloid adenomatous goiter may be given, indicating the active proliferation of follicular epithelial cells in the thyroid.78 In a moderately cellular nodular lesions, where smears show follicular cells in clusters and acinar pattern, with foam cells and colloid in the background, a report of hyperplastic nodular goiter is given (Jayaram, 2006). It is a rare supplicative lesion usually preceded by an upper respiratory tract infection. It begins with fever, tachycardia, diffuse enlargement and intense pain in the anterior cervical region, high ESR. The common causative organisms are Gram Positive Cocci like Staphylococci, Streptococci etc. In an impaired immuno competent host, it is caused by fungus (Aspergillus, Cryptococcus, Candida), virus like CMV and others (Sanchez and Stahl, 2006; Davidson and Campora, 2008).

The thyroid is a relatively common site for metastasis in disseminated malignancy as it is richly vascularized structure. Rarely thyroid metastases may be the presenting feature of an otherwise occult primary such as clear cell carcinoma of kidney (Jayaram, 2006). A metastatic tumor can clinically simulate a primary neoplasm or even thyroiditis (Rosen et al., 1978). Lung, gastrointestinal tract, breast, kidney, melanoma and lymphoma are the most frequent site of origin.

**MATERIALS AND METHODS**

The present study is a two year prospective study, carried out in Department of Pathology in a tertiary care hospital from May 2014 to April 2016. A total of 158 cases of patients with palpable thyroid lesions were included in the study. Patients with palpable thyroid lesions from all age groups and both sexes and who gave consent for thyroid FNA were included.

The procedure was first explained to the patient to reduce anxiety, apprehension and to gain the confidence of the patient. Informed and written consent was obtained.
OBSERVATION AND RESULTS

The present prospective study was carried out in Department of Pathology over a period of two years from May 2014 to April 2016. Fine needle aspirations were done in 158 cases presenting with palpable thyroid lesions. Smears were reported using The Bethesda System of Reporting Thyroid Cytopathology (TBSRTC). Of these, 36 patients underwent surgical excision subsequently and the excised thyroid specimens were sent to Department of Pathology for histopathological examination. Cyto-histopathological correlation were done in these 36 cases.

Table 1: Age wise distribution of cases with palpable thyroid lesions

| Age range in years | Number of cases | Percentage (%) |
|--------------------|----------------|----------------|
| 1-10               | 01             | 0.6            |
| 11– 20             | 04             | 2.4            |
| 21 – 30            | 35             | 22.2           |
| 31 – 40            | 49             | 31.0           |
| 41 – 50            | 35             | 22.2           |
| 51 – 60            | 17             | 10.8           |
| >60                | 17             | 10.8           |
| Total              | 158            | 100            |

In the present Table 1 shows, the youngest patient was 10 years old and the eldest patient was 75 years old. Maximum number of patients 49 (31.0%) were seen in the age group of 31-40 years. Mean age of patients in the present study was 40.8 years.

Table 2: Duration of thyroid swelling

| Duration               | Number of cases | Percentage (%) |
|------------------------|-----------------|----------------|
| <1 month               | 22              | 13.9           |
| 1 month - 6 months     | 79              | 50.0           |
| >6 months - 1 year     | 31              | 19.6           |
| >1 year - 5 years      | 16              | 10.1           |
| >5 years               | 10              | 6.3            |
| Total                  | 158             | 100            |

In Table 2 shows that, the duration of thyroid swelling ranged from less than 1 month to more than 5 years. Maximum number of patients 79 (50%) were presented within 1 to 6 months of duration.

As seen in Table 3, all the patients with palpable neck swelling who underwent FNAC were included in the present study. All these patients of neck swelling were either diffuse or nodule. Size of the thyroid swelling varied from as small as 1 cm to as large as 18 cm.

Table 3: Associated symptoms in patients having palpable thyroid lesions

| Symptoms                     | Number of cases | Frequency (%) |
|------------------------------|-----------------|---------------|
| Thyroid swelling             | 158             | 100           |
| Pain                         | 07              | 4.43          |
| Weight loss                  | 06              | 3.78          |
| Dysphagia                    | 02              | 1.26          |
| Hoarseness of voice          | 02              | 1.26          |
| Fever                        | 01              | 0.63          |
| Enlarged cervical LN         | 01              | 0.63          |

As seen in Table 4, Goiter and MNG were the most common clinical diagnosis in 102 (64.5%) cases followed by solitary thyroid nodule in 31 (19.6%) cases out of the total 158 cases. Malignancy was clinically diagnosed in 08 (5.1%) cases of the total 158 cases in the present study.

Table 4: Clinical diagnosis at the presentation of patients with palpable thyroid lesions

| Clinical diagnosis          | Number of cases | Percentage (%) |
|-----------------------------|-----------------|----------------|
| Goiter, MNG                 | 102             | 64.5           |
| Solitary thyroid nodule     | 31              | 19.6           |
| Cystic lesion               | 02              | 1.3            |
| Thyroiditis                 | 15              | 9.5            |
| Malignancy                  | 08              | 5.1            |
| Total                       | 158             | 100            |

As seen in Table 4, thyroid enlargement, whether diffuse or nodule, leads to a battery of investigations, mainly to rule out the possibility of a neoplasm or thyroiditis. FNAC plays an important role in the diagnosis of various palpable lesions of the thyroid and is now widely used. FNAC is usually the first line investigation and other investigations like ultrasound examination, thyroid function tests, thyroid scan and antibody levels are done subsequently with an aim to select the patients who require surgery and those which can be managed conservatively (Giuffrida and Gharib, 1995; Micco et al., 1994).

We studied fine needle aspiration cytology in total 158 cases of palpable thyroid lesions over a period.
of two years (May 2014 to April 2016). Out of total 158 cases, 36 cases underwent subsequent surgery. Hence, cyto-histopathological correlation was possible in 36 cases only in the present study. The cytological and histopathological features in these 36 cases were analyzed in order to evaluate the efficacy of FANC for accurate diagnosis and sub-typing of thyroid lesions.

In the present study, the duration of thyroid swelling ranged from less than 1 month to more than 5 years which was comparable with study done by Park JH et al (Park et al., 2014). All the patients were having swelling either diffuse or nodular. Out of 158 patients, 22 patients had diffuse swelling while others had either single or multinodular swelling. Among 22 cases with diffuse swelling, 12 cases were diagnosed as thyroiditis on cytology. Usually patients with thyroiditis present with diffuse swelling which was also seen in the present study (Baloch et al., 2001).

FNAC of thyroid swelling reported using the Bethesda System for Reporting Thyroid Fine needle aspirates: A clinicocytological study with histopathological correlation was done. Thyroid FNAC proves to be a reliable, simple, safe and cost effective out-patient procedure with high patient acceptance and with almost nil complications. TBSRTC is an excellent reporting system, as it showed specificity of 100 % in the present study, which helped to diagnose benign cases correctly and to avoid unnecessary surgery. Palpable thyroid lesions which are reported as ND/UNS (category I) on FNAC need separate attention. It is suggested to repeat FNA with USG guidance in such cases and persistent ND/UNS lesions are advised to undergo surgical excision for definitive diagnosis. The six diagnostic categories of TBSRTC are well defined, morphologically distinct and ensure uniform reporting system for the thyroid lesions on FNAC. Accurate diagnosis of thyroid malignancy helps patient for timely therapeutic intervention. Optimal clinical management of patients with thyroid nodule is possible due to clinically useful, unambiguous terminologies used in TBSRTC. TBSRTC allows standardization in reporting and improves perceptions of diagnostic terminologies between cytopathologists and clinicians for better consistent management approaches for patients with palpable thyroid lesions.

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Conflict of Interest
The authors declare that they have no conflict of interest for this study.

REFERENCES
Baloch, Z. W., Hendreen, S., Gupta, P. K., LiVolsi, V. A., Mandel, S. J., Weber, R., Fraker, D. 2001. Interinstitutional review of thyroid fine-needle aspirations: Impact on clinical management of thyroid nodules. *Diagnostic Cytopathology*, 25(4):231–234.

Davidson, H. G., Campora, R. G. 2008. Thyroid In: Bibbo M, Wilbur DC. Comprehensive Cytopathology. pages 633–670.

Frable, W. J. 1989. Needle aspiration biopsy: Past, present, and future. *Human Pathology*, 20(6):504–517.

Giuffrida, D., Gharib, H. 1995. Controversies in the management of cold, hot, and occult thyroid nodules. *The American Journal of Medicine*, 99(6):642–650.

Haaga, J. R. 2005. Interventional CT: 30 years’ experience. *European Radiology Supplements*, 15(S4):d116–d120.

Hag, I. A. E., Kollur, S. M., Chiedozi, L. C. 2003. The role of FNA in the initial management of thyroid lesions: 7-year experience in a district general hospital. *Cytopathology*, 14(3):126–130.

Holm, H. H., Rasmussen, S. N., Kristensen, J. K. 1973. Ultrasonically guided percutaneous puncture technique. *Journal of Clinical Ultrasound*, 1(1):27–31.

Jayaram, G. 2006. Atlas and text of thyroid cytology. pages 104–104.

Kaur, K., Sonkhya, N., Bapna, A. S., Mital, P. A. 2002. Comparative study of fineneedle aspiration cytology, ultrasonography and radionuclide scanin the management of solitary thyroid nodule: A prospective analysis of fifty cases. *Ind J Otolaryngol Head Neck Surg*, 54(2):96–101.

Langlois, S. L., Orell, S. R., Sterrett, G. F., Walters, M., Whitaker, D. 1992. Organ imaging for guidance of biopsy needles. *Manual and Atlas of Fine Needle
Aspiration Cytology, pages 26–32.

Mazzaferri, E. L. 1992. Thyroid cancer in thyroid nodules: Finding a needle in the haystack. *The American Journal of Medicine*, 93(4):359–362.

Micco, C. D., Zoro, P., Garcia, S., Skoog, L., Tani, E. M., Carayon, P., Henry, J.-F. 1994. Thyroid peroxidase immunodetection as a tool to assist diagnosis of thyroid nodules on fine-needle aspiration biopsy. *European Journal of Endocrinology*, 131(5):474–479.

Orell, S. R., Sterrett, G. F., Whitaker, D., Vielh, P., Orell, S. R., Gregory, F., Sterrett, D., Whitaker 2011. Fine Needle Aspiration Cytology. pages 8–27, New Delhi. Elsevier India Pvt. Ltd.

Park, J. H., Yoon, S. O., Son, E. J., Kim, H. M. 2014. Incidence and Malignancy Rates of Diagnoses in the Bethesda System for Reporting Thyroid Aspiration Cytology: An Institutional Experience. *Korean J Pathol*, 48:133–139.

Renshaw, A. A., Krane, J. F. 2013. Can changing the terminology for benign aspirates reduce the atypia of undetermined significance/follicular lesion of undetermined significance rate in thyroid fine-needle aspirates? *Cancer Cytopathology*, 121(4):175–178.

Rosen, I. B., Strawbridge, H. G., Walfish, P. G., Bain, J. 1978. Malignant pseudothyroiditis: A new clinical entity. *The American Journal of Surgery*, 136(4):445–449.

Sanchez, M. A., Stahl, R. E. 2006. The thyroid, parathyroid and neck masses other than lymphocytes. *Koss LG, Melamed MR. Diagnostic cytology and its histopathological basis. 5th ed. Philadelphia: Lippincot Williams and Wilkins*, pages 1234–1402.