Original Article

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Cytopathological Study of Palpable Thyroid Lesions Using the Bethesda System for Reporting of Thyroid Cytopathology (TBSRTC)

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Abstract

Introduction: Fine needle aspiration cytology (FNAC) is the first line investigation for the diagnosis of palpable thyroid lesions. Cytological diagnosis of palpable thyroid lesions and their classification on the bases of Bethesda Classification (TBSRTC 2007) makes uniformity in the diagnosis, facilitate communication among cytopathologists and surgeons and guide the further management. *Aims and Objectives:* The aim of the study was to diagnose and classify palpable thyroid lesions on the bases of Bethesda Classification and to correlate the diagnosis with relevant clinical history and investigations and histopathological diagnosis if possible. *Materials and Methods:* This study was carried out in a tertiary care hospital from January 2011 to December 2012. The clearance was obtained from ethical committee of our hospital. The study included 156 cases which were classified as non diagnostic 8 cases (5.1%), benign category 123 cases (78.84%), atypia of undetermined significance/ suspicious of follicular neoplasm 11 cases (7.05%) and malignant 3 cases (1.92%). *Conclusion:* Cytological classification of palpable thyroid lesions on the lobes of Bethesda classification helps to guide proper management of patients and facilitates better communication among cytopathologists and surgeons.

Keywords: Fine Needle Aspiration Cytology; Palpable Thyroid Lesion; Bethesda Classification.

Introduction

Thyroid nodules are common clinical findings that have a reported prevalence of 4-7% in general population [1]. Distinction of the benign lesions from a malignant can't be made reliably by clinical examination. Several diagnostic tests have been used for diagnosis of these lesions. Fine needle aspiration cytology (FNAC)has been recommended as the initial step in the evaluation of thyroid nodules [2,3]. Despite thyroid cytology being routinely used as an investigation of choice, there was no standardized terminology for thyroid cytopathology reporting till recent past [4]. Various reporting formats have been used in the past. In October 2007, National Cancer Institute held a Conference in Bethesda to formulate a standardized guidelines for reporting of thyroid cytopathology. Recommendations of the committee were published world wide as "The Bethesda System for Reporting Thyroid Cytopathology [5,6]. Standard guidelines of reporting system for cytopathology reporting makes it easier for clinicians in understanding the results and thereby helping them in management of the cases with thyroid nodule[7,8].

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Materials and Methods

The present study was two year prospective study carried out in our institute from January 2011 to December 2012. Total 156 cases were studied during the period of two years. The study was carried out after getting the clearance from the ethics clearance committee of our university. All the patients included in the study were explained the procedure and informed consent was taken in the vernacular language. Smears were prepared from the material procured by aspiration or non-aspiration techniques.

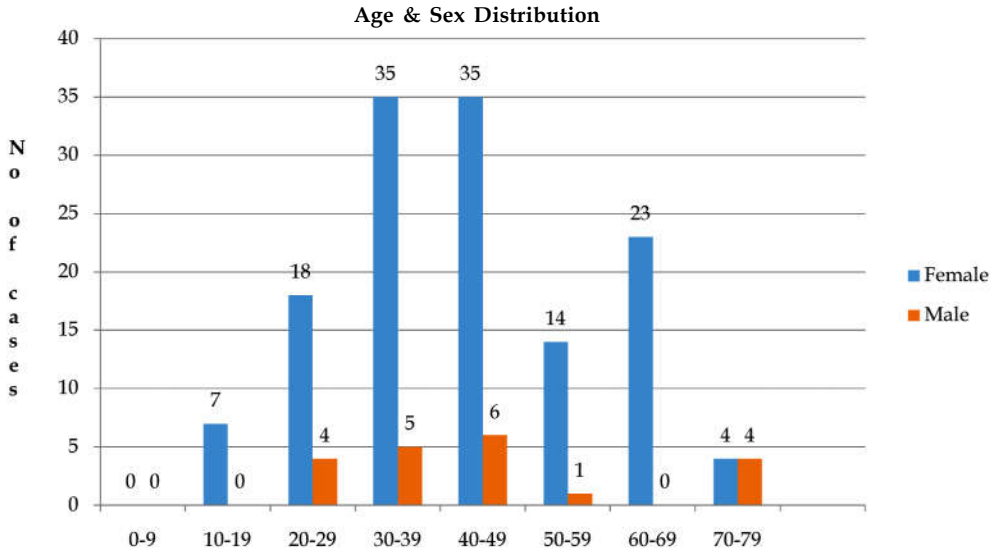
Dry fixed smears were stained by Geimsa stain and wet fixed smears were first fixed in ether-alcohol (1:1) and stained with hematoxylin and eosin stain. All slides were studied microscopically and classified using The Bethesda System for Reporting Thyroid Cytopathology (TBSRTC-2007) [Table 1].

Table 1: Bethesda (2007) guidelines and recommendations[5]

Non -diagnostic Category	Risk of Malignancy(%)	Usual Management
Non Diagnostic/Unsatisfactory	Variable	Repeat USG Guided FNAC
Benign	0-3	Clinical follow up
Atypia of undetermined significances/follicular lesion of undetermined significance diag	5-15	Repeat fnac
Follicular neoplasm/suspicious of follicular neoplasm	15-30	Surgical lobectomy
Suspicious for malignancy	60-75	Near total thyroidectomy or surgical lobectomy
Malignant	97-99	Near total thyroidectomy

Results

- Total 156 cases were subjected to FNAC for palpable thyroid lesion within a period of two years from January 2011 to 2012 in our institute.
- All the patients tolerated the procedure without any complications.
- Of these six patients were subjected to surgical excision for histopathological examination (4 cases of goitre because of excess pressure symptoms & 1 case each of follicular adenoma & papillary carcinoma).



Graph 1: Graphical presentation of Age and Sex distribution

Age of the patients ranged from 11 years to 78 years with a mean of 45 years. Female: Male ratio was 6:1. The presenting complaints were swelling (156 cases, 100%), pain (14 cases, 8.9%), dysphagia (13 cases,8.3%), weight loss (4 cases, 2.56%), palpitation (3 cases, 1.92%)& hoarseness of voice (2 cases, 1.28%).

Table 2: FNAC diagnosis of lesions on the basis of bethesda system

No	Nomenclature	No of cases	%
I	Non diagnostic/ Unsatisfactory	8	5.1
Ii	Benign	123	78.84
iii	Atypia of undetermined significance/Follicular lesion of undetermined significance	11	7.05
iv	Follicular neoplasm /Suspicious of follicular neoplasm	11	7.05
v	Suspicious for malignancy	0	0
vi	Malignant	3	1.92
	Total	**156**	**99.96**

The duration of the complaints ranged from 4 days to 25 years which was less than 1 year in 66.02% cases. The size of the swelling varied from 0.5- 20cm in 79.8% of patients. Colloid goitres presented with huge swellings.

In cases of colloid goitre (111 cases) the aspirate was brownish and abundant while it was scanty and hemorrhagic in cases of thyroiditis (11cases) and neoplasms (14 cases).

Non-Diagnostic/Unsatisfactor y (TBSRTC-I)

On the basis of Bethesda Classification 8 (5.1%) cases were considered as non-diagnostic (inadequate no. of follicular cells, thick smears obscuring morphology and drying artifacts). Repeat guided FNAC was advised to these patients.

Benign Lesions (TBSRTC-II)

Out of 123 (78.84%) benign lesions majority of cases were colloid goitre (111 cases, 90.24%)(Figure 1 and Figure 2), the remaining being thyroiditis (11 cases, 8.9%) and a case of thyroglossal duct cyst (0.8%). All cases of goitre revealed abundant brown coloured aspirate. Consecutive management & clinical follow up was advised to these patients except in 4 cases of goiter with excess pressure symptom & a case of thyroglossal duct cyst(Figure 3) where surgical excision was recommended.

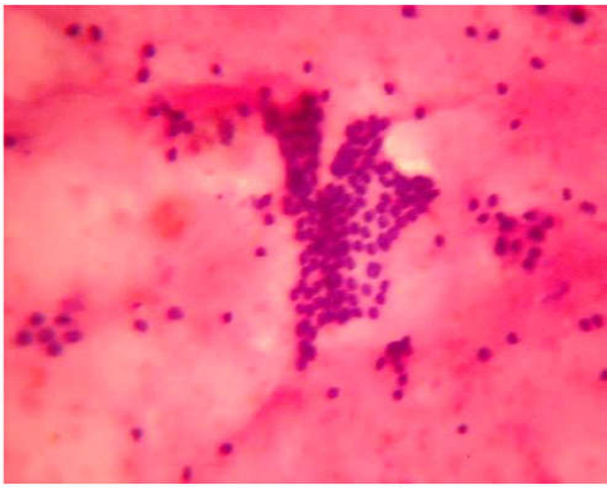


Fig. 1: Photomicrograph of FNA smear showing follicular cells with colloid in the background in a case of colloid goitre. (H&E stain,100x)

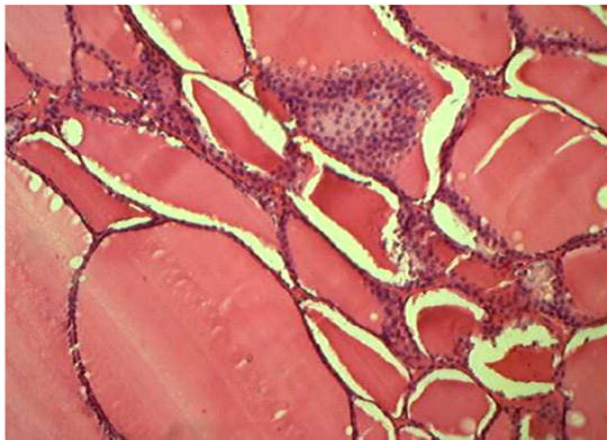


Fig. 2: Photomicrograph showing thyroid tissue with follicular cells and colloid filled spaces in a case of colloid goitre. (H&E stain, 100x)

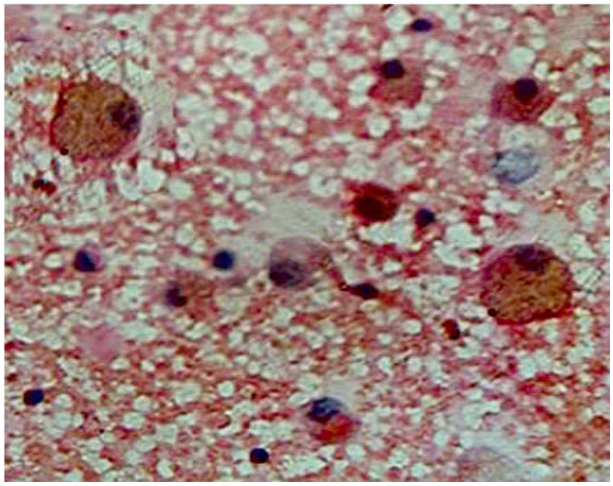


Fig. 3: Photomicrograph of FNA smear in a case of cystic lesion of thyroid showing cyst macrophages. (H&E stain, 400x)

Goitre

Among the 111 cases of goitre 74 (66.6%) were colloid goiter the remaining 28 (25.25%) being goitre with cystic change and multinodular goiter 9 (8.10%). Excision was done in 4 cases due to pressure symptoms and the diagnosis was confirmed on histopathology. Thyroid function test were done in 13 cases, majority of cases were euthyroid (10 cases-76.9%) while 3 cases (23.07%) were hyperthyroid.

Thyroiditis

Eleven (8.9%) cases were diagnosed as thyroiditis among which 7 were lymphocytic thyroiditis (63.6%) (Figure 4), 2 cases of Hashimoto's thyroiditis (18.18%)

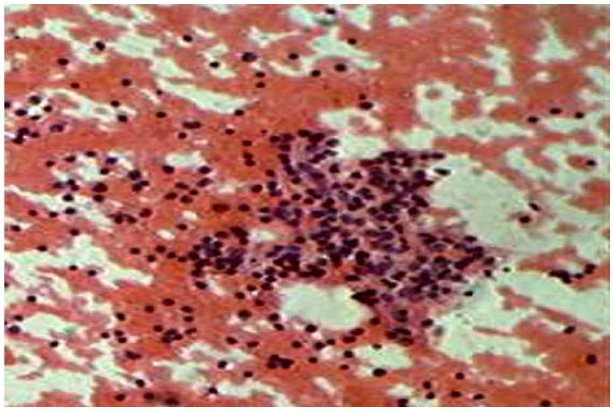


Fig. 4: Photomicrograph of FNA smear showing lymphocytic infiltration in a case of lymphocytic thyroiditis.(H&E stain, 100x)

(Figure 5) and one case each of De-Quervain's (Figure 6) and granulomatous thyroiditis (9.09%). All patients were female presented with short term complaints of less than six months in 7 cases (63.6%) and the longest duration was 2 years.In all cases of thyroiditis size of the swelling was less than 5 cm and aspiration was scanty and hemorrhagic. TFT was done in 8 cases. 3 cases of lymphocytic thyroiditis were euthyroid while 3 were hypothyroid. One case each of Hashimoto's and De Quervain'sthyroidits revealed hypothyroid status as documented in literature. USG was done in 2 cases and cyto- USG correlation was 100%.

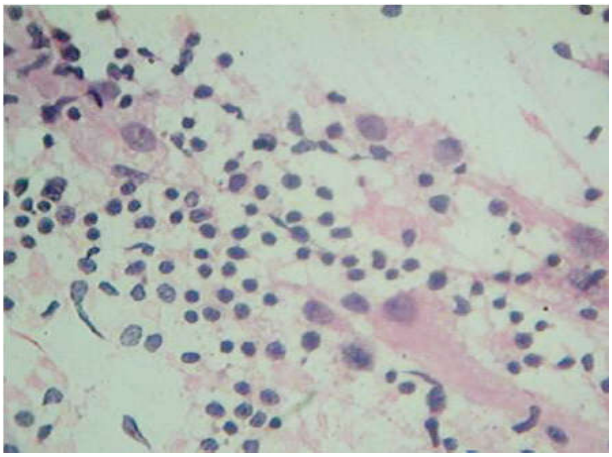


Fig. 5: Photomicrograph of FNA smear showing lymphocytic infiltration with follicular cells in a case of Hashimoto thyroiditis. (H&E stain, 400x)

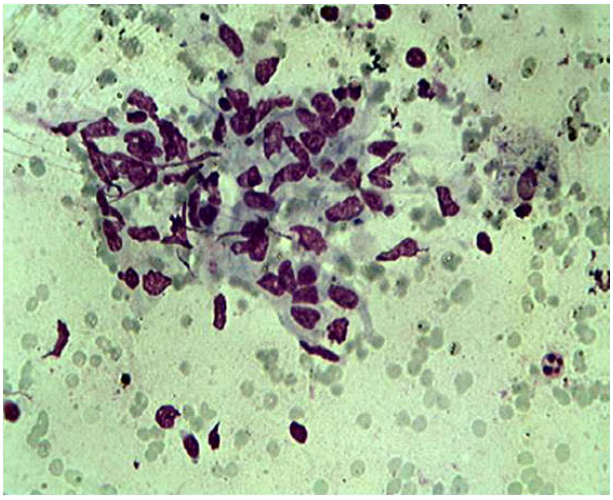


Fig. 6: Photomicrograph of FNA smear in a case of de Quervain's thyroiditis. (MCG stain, 400x)

Thyroglossal Duct CYST

A single case of 25 years female presented with one case of thyroglossal duct cyst which was present since 11 years. The aspirate was hypocellular and showed foamy macrophages with few squamous epithelial cells on the background of colloid.

Follicular Lesion of Undetermined Significance /AUS – (TBSRTC-III)

Eleven (7.05%) cases were seen in this category which could not be easily classified as benign, suspicious or malignant lesion in various setting like micro-folllicular pattern in sparsely cellular aspirate, mixed cytological pattern that includes microfollicles & macrofollicles, focal atypia mimicking papillary carcinoma in a benign appearing background. Repeat FNAC was advised to these patients.

Follicular Neoplasm(FN)/ Suspicious of FN- (TBSRTC-IV)

11 cases (7.05%) of follicular neoplasm (Figure 7 & Figure 8) were notedin the age group of 32-55 years, out of which 10 were female.The duration of symptoms ranged from 1-5 years while the size of the swelling ranged from 2-8 cm.The aspirate was scanty and hemorrhagic. Excision was advised and done in one patient and on histopathological examination diagnosis was confirmed as follicular adenoma.

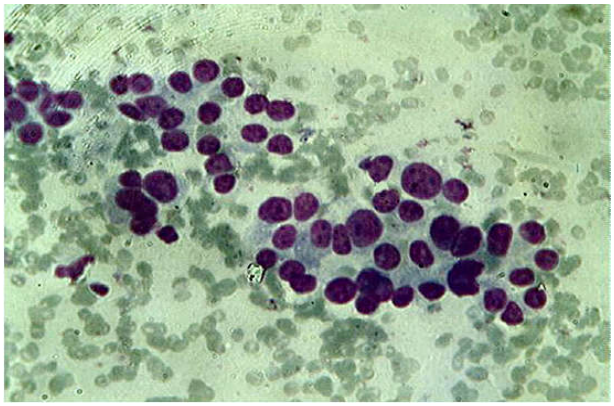


Fig. 7: Photomicrograph of FNA smear showing follicular cells with mild pleomorphism in a case of follicular neoplasm. (MCG stain, 400x)

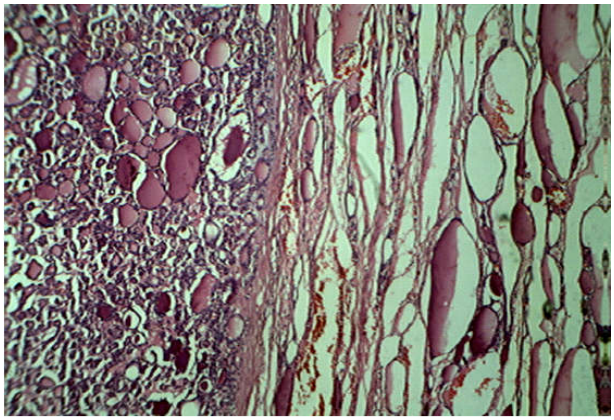


Fig. 8: Photomicrograph showing section of thyroid tissue in a case of Follicular adenoma. (H&E stain, 100x)

Malignant -TBSRTC-VI

We diagnosed 3(1.92%) cases of malignancy as papillary carcinoma (Figure 9 & Figure 10). 2 patients

were female aged 25 and 65 years, while the third was a 24 years male patient. Subtotal thyroidectomy was advised & was done in 1 case.

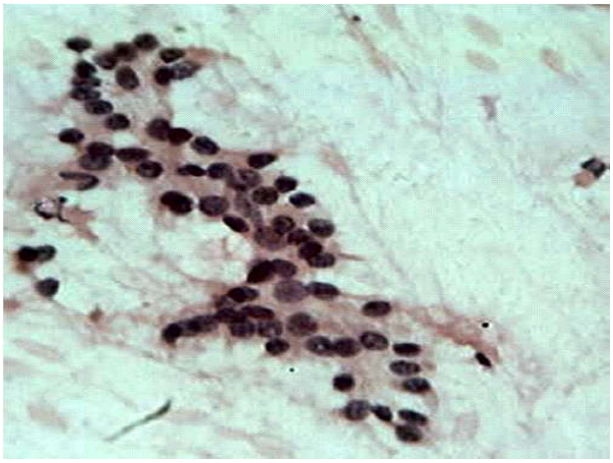


Fig. 9: Photomicrograph showing papillary arrangement of neoplastic cells in a case of Papillary carcinoma of thyroid. (H&E stain, 400x)

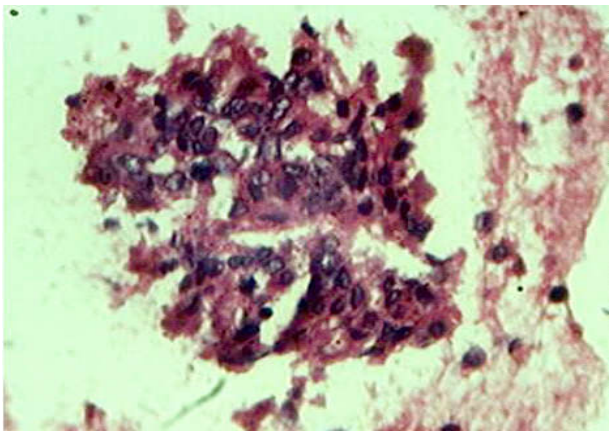


Fig. 10: Photomicrograph of cell block showing neoplastic cells in a case of papillary carcinoma. (H&E stain, 400x)

Cyto-Histo Correlation

Surgical excision was done in 6 cases. Cytopathological and histopathological correlation was 100% (highest correlation). Considering histopathology as a gold standard sensitivity, specificity, predictive value of positive and negative tests was100% in our study.

Correlation with TFT

TFT was done in 24 cases, maximum (16 cases-66.6%) cases were euthyroid while cases of lymphocytic thyroiditis (3 cases), Hashimoto' sthyroiditis (1 case), DeQuervain's thyroiditis (1 case) revealed hypothyroid status.Hyperthyroidism (3 cases-12.5%) was seen in three cases of toxic goitre.

Cyto- USG Correlation

USG was done in 34 cases out of which 32 cases were matched with cytopathological diagnosis(94%). In two cases of USG mismatch one was diagnosed as thyroiditis on USG where FNAC diagnosis was colloid goitre.The other case was diagnosed as multinodular goiter on USG turned out as follicular neoplasm on FNAC.

Discussion

Thyroid nodules are very common clinical problems noted during examination by palpation. FNAC of thyroid nodule is the investigation of choice to decide on the further management of the nodule. Even though majority of the nodules are benign, cytological examination must be done to rule out malignancy [9].

Dr.Helen Wang has reviewed various diagnostic category systems for thyroid FNAC [10]. Data demonstrates that the Bethesda System for Reporting Thyroid Cytopathology is excellent as each diagnostic category convey's specific risk of malignancy which offers guidance for patient management [11].

The present study has 8 (5.1%) cases in category 1 i.e Non diagnostic/Unsatisfactory. Studies by other authors had 1.2% to 16.4% cases in this category [12-20]. As per TBSRTC guidelines all the patients were advised reaspiration after a minimum of 3 months. Bethesda system does not provide implied risk of malignancy for this category whereas a study found a rate of 8.9% in this category [15].

The benign category had 123(78.9%) cases with colloid goitre being the most common (90%). Studies in past had a range of 34% to 87.5% of cases in this category [12,20].

The category AUS/FLUS is reserved for specimens that contained calls with architectural and/or nuclear atypia. That is not sufficient to be classified as suspicious for follicular neoplasm or suspicious for malignancy. The atypia is more marked than that can be ascribed confidently to benign changes [20].

In the present study we had 11 (7%) cases in the category of AUS/FLUS. Studies have reported a range of 3.2-29% of cases [12-20]. TBSRTC suggests that frequency of AUS interpretation should be in the range of approximately 7% of all thyroid cases.

The fourth category of FN/SFN had 11(7%) cases. Clear guidelines have been provided by TBSRTC for this category. Studies by various authors have shown cases in this category of TBSRTC to be in range of 2.2 to 16.1% of all the cases.

Fifth category as per TBSRTC is of SFM. We had zero case in this category whereas study by other authors showed cases in the range between 1.3 to 10% cases [12-20].

In malignant category we had 3(2%) cases where as recent studies had a range of 2.9% to 11% [12-19]. One study had 2.2% cases in this category [20]. All the findings in the present study correlate with the findings by other authors [12-20].

Guidelines by TBSRTC are very clear for each category TBSRTC also provides guidelines for ancillary techniques like Immunohistochemistry, Immunocytochemistry especially for cases with suspicious cytopathology. IHC on cell block from a material aspirated during a dedicated pass can help in the diagnosis. Immunocytochemistry on the cytospin material can also be helpful provided all the parameter are validated [21].

Conclusion

Cytological classification of palpable thyroid lesions on the lobes of Bethesda classification helps to guide proper management of patients and facilitates better communication among cytopathologists and surgeons.

References

1. M.Saddique et al, H.Nongrum et al, FNAC: A reliable diagnostic toolin solitary thyroid nodule and multinodulargoitre. Pakistan journal of surgery. 24(3); 188-91.
2. Piromali D, Martelli G, Del Parto I, et al. The role of fine neelde aspiration in the diagnosis of thyroid nodules. Analysis of 795 consecutive cases. Journal of Surgical Oncology. 1992; 50: 247-50.
3. De Silva MVC. Diagnosis of thyroid disease-the role of the pathologist. Ceylon Medical Journal. 2007; 52: 4-6.
4. Redman R, Yoder BJ, Massoll N. Perceptions of diagnostic terminology and cytopatholoic reporting of fine-needle aspiration biopsies of thyroid nudules: a survey of clinicians and pathologists. Thyroid. 2006; 16; 1003-1008.
5. Cibas ES, Sanchez MA,"The national cancer institute thyroid fine-needle aspiration state-of-the-science conference: inspiration for a uniform terminology linked to management guidelines", Cancer Cytopathology. 2008; 114(2): 71-73.
6. Baloch ZW, LiVolsi VA, Asa SL, et al.,"Diagnostic terminology and morphologica criteria for cytologic diagnosis of thyroid lesions: a synopsis of the national cancer institute thyroid fine-needle aspiration state of the science conference", Diagnostic Cytopathology. 2008; 36(6): 425-437.
7. Basharat R, Bukhari MH, Saeed S, Hamid T. Comparison of fine neelde aspiration cytology and thyroid scan in solitary thyroid nodule. Patholog Res Int. 2011: 754041.
8. Bongiovanni M, Spitale A, Faquin WC, et al. The Bethesda System for Reporting Thyroid Cytopathology; a meta-analysis. ActaCytol. 2012; 56: 333-339.
9. Langer JE, Baloch ZW, McGrath C, et al. Thyroid nodule fine-needle aspiration. Semin Ultrasound CT. MR 2012; 33: 158-165.
10. Wang HH. Reporting thyroid fine-needle aspiration: literature review and a proposal Diagn Cytopathol. 2006; 34: 67-76.
11. Theoharis CG, Schofield KM, Hammers L, et al. The Bethesda thyroid fine-needle aspiration classification system: year 1 at an academic institution. Thyroid. 2009; 19: 1215-1223.
12. Yang J, Schnadig V, Logrono R, et al. "Fine needle aspiration of thyroid nodules: a study of 4703 patients with histologic and clinical correlations", Cancer. 2007; 111(5): 306-315.
13. Nayar R and Ivanovic M, "The indeterminate thyroid fine-needle aspiration: Experience from an academic center using terminology similar to that proposed in the 2007 national cancer institute thyroid fine needle aspiration state of the science conference", Cancer Cytopathology. 2009; 117(3): 195-202.
14. Theoharis CGA, Schofield KM, Hammers L, et al. "The Bethesda thyroid fine-neelde aspiration classification system: year 1 at an academic institution", Thyroid. 2009; 19(11); 1215-1223.
15. Jo VY, Stelow EB, Dustin SM, et al. "Malignancy risk for fine-needle aspiration of thyroid lesions according to the Bethesda system for reporting thyroid cytopathology", The American Journal of Clinical Pathology. 2010; 134(3); 450-456.
16. Bonzanini M, Amadori P, Morelli L, et al. " Subclassification of the 'grey zone' of thyroid cytology: a retrospective descriptive study with clinical, cytological and histological correlation", Journal of Thyroid Research, vol. 2011, Article ID 251680, 8 pages, 2011.
17. Broome JT and Solorzano CC, " The impact of atypia/ follicular lesion of undetermined significance on the rate of malignancy in thyroid fine-neelde aspiration: evaluation of the Bethesda system for reporting thyroid cytopathology", Surgery. 2011; 150(6): 1234-1241.
18. Al-Shraim MM, Kood OM, Hussein MR, et al. "Assessment of malignancy rate in thyroid nodules according to the Bethesda system of fine-needle aspiration: report from a tertiary center in the Southwestern region of Saudi Arabia", Saudi Medical Journal. 2012; 33(2): 167-171.
19. Mondal SK, Sinha S, Basak B, et al. 'The Bethesda system for reporting thyroid fine needle aspirates: a cytologic study with histologic follow-up", Journal of Cytology. 2013; 30(2): 94-99.
20. Mehra P and Verma AA. Thyroid cytopathology Reporting by the Bethesda System: A Two-Year Prospective Study in an Academic Institution. Hindawi publishing Corporation. Vol 2015, Article ID 240505, 11 pages.
21. Filie AC, Asa SL, Geisinger KR, et al. "Utilization of ancillary studies in thyroid fine needle aspirates: a synopsis of the national cancer institute thyroid fine needle aspiration state of the science conference", Diagnostic Cytopathology. 2008; 36(6): 438-441.