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A Comparative Study between Conventional System and the Bethesda System Applied For Reporting Thyroid Cytopathology

Amarnath Kumar Nayak*, Dr. [Prof.] Ratna Choudhary **, Nisha Kumari***
**Post Graduate Student, Department of Pathology, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand.*
***MBBS, M.D. (Patho.), Professor, Department of Pathology, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand.*
****Post Graduate Student, Department of Pathology, Rajendra Institute of Medical Sciences (RIMS), Ranchi, Jharkhand*
Corresponding Author: Dr. [Prof.] Ratna Choudhary

Abstract:
Aim and objectives: *To compare the conventional and the Bethesda system for reporting thyroid cytopathology(TBSRTC), to correlate the cases with histology wherever available and to determine the sensitivity, specificity, Positive predictive value and Negativepredictive value of both the methods.*
Material and methods: *A total of **237** patients who presented with thyroid gland swelling were subjected to thyroid fine needle aspiration cytology(FNAC) and the smears were made followed by LG and H&E staining and reporting was done. The conventional system used at our centre includes description of microscopic findings of the case along with an impression at the end. The categorization according to the Bethesda system of reporting thyroid cytology were done using criteria published in the atlas and related literature. The cytological diagnosis was correlated with the histological diagnosis wherever it was available. The sensitivity, specificity, false positive and false negative rates were calculated considering cytology as screening test for differentiating between neoplastic and non-neoplastic lesions.*
Results: *When the results of the conventional system were compared with the Bethesda system was found to be more superior. Sensitivity of the Bethesda was high (89%), specificity of Bethesda system was also significantly high(90%).*

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I. Introduction

Fine needle aspiration cytology (FNAC) has been widely accepted as diagnosis procedure of choice in the evaluation of patients presenting with thyroid nodules. The technique is a safe, minimally invasive, easily performed with minimal patient discomfort, efficient and excellent cost effective method of thyroid lesions. Its main purpose is to provide rational approach to management and to determine the correct surgical procedure when it is required. A standardised categorical system for FNAC reporting can make results easier to understand for clinicians and give clear indications for therapeutic action.

Aim and objectives

- To compare the conventional and the Bethesda system for reporting thyroid cytopathology (TBSRTC).
- To correlate the cases with histology wherever available.
- To determine the sensitivity, specificity, false positive and false negative rates of both methods.

II. Material and Methods

A prospective study was conducted on 237 smears of thyroid swelling which were sent for fine needle aspiration to the department of pathology from February 2018 to 2019 and the Bethesda system for reporting thyroid cytopathology was followed in comparison to the old conventional reporting system. Histopathology was used as a gold standard to compare the sensitivity of both system.

Conventional method

As per conventional method of reporting, the cases were diagnosed and placed under the following categories:

- **Non diagnostic/Unsatisfactory:** when smears were hemorrhagic or containing less than six groups of well-preserved follicular cells on each group contains less than ten cells.

- **Colloid cyst / colloid goitre with cystic changes:** when smear containedfollicular cells, thin and thick colloid in the background and hemosiderin laden macrophage were seen in the smears.
- **Colloid goitre:** when smears contained follicular cells with abundant thick colloid in the background.
- **Lymphocytic thyroiditis:** when smear contained follicular cells with polymorphic population of lymphoid cells and containing Hurthle cells.
- **Indeterminate smears:** when smears containing cells with findings that were not clearly benign but were not diagnostic of a neoplasm or malignant.
- **Follicular Neoplasm:** when smears contained many follicular cells without or scanty colloid in the background or when smears contain predominant population of Hurthle cells.
- **Suspicious for malignancy:** Suspicious when aspirates suggested a follicular neoplasm, i.e, hyper cellular sample with scant colloid and a significant colloid and a significant proportion of microfollicles, trabeculae, and crowded overlapping clusters of follicular cells.
- **Malignant lesions**
  - Papillary carcinoma
  - Medullary carcinoma
  - Anaplastic carcinoma
  - Lymphoma
  - Metastatic

TBSRTC

The same cases were reported as per Bethesda system of reporting having following six categories:

1. **Non diagnostic / Unsatisfactory:** cystic fluid only virtually a cellular specimen other (obscuring blood, clotting artefact, etc). For a thyroid FNA specimen to be satisfactory for evaluation (and benign), at least six groups of benign follicular cells were required, each composed of at least 10 cells.
2. **Benign :** consistent with benign follicular nodule (includes colloid goitre, colloid cyst, lymphocytic thyroiditis, Grave's Disease, granulomatous [sub acute] thyroiditis) and others.
3. **Atypia of undetermined significance (AUS) / Follicular lesion of undetermined significance:**
4. **Follicular neoplasm / suspicious for follicular neoplasm:** Specify if Hurthle cell (oncocytic) type.
5. **Suspicious for malignancy:** Suspicious for papillary carcinoma, suspicious for medullary carcinoma, suspicious for metastatic carcinoma, suspicious for lymphoma.
6. **Malignancy:** Papillary thyroid carcinoma, Poorly differentiated carcinoma, Medullary thyroid carcinoma, Anaplastic carcinoma, Metastatic carcinoma, Lymphomas and others.

Histological diagnosis of patients who had undergone surgery was used as gold standard for correlation with cytological interpretation.

III. Result

Distribution of cases as per conventional method of reporting was as per **Table – 1 .**Distribution of cases as per Bethesda system of reporting was as per **Table -2** .

Statistical analysis

The sensitivity, specificity and diagnostic accuracy were calculated considering thyroid FNA as a 'screening test'. FNA specimens interpreted as benign were considered to be true negative samples and the remaining categories were considered to be true positive samples because they led to a recommendation of surgery. The false positive category included cases that were diagnosed as malignant but which were confirmed as benign on histopathological evaluation. The false – negative cases included those diagnosed as benign on FNA but confirmed as malignant on histopathology.

Conventional system of reporting

- Sensitivity – 77%
- Specificity – 69%
- Positive predictive value – 37%
- Negative predictive value – 93%

Bethesda system of reporting

- Sensitivity – 89%
- Specificity – 90%
- Positive predictive value – 69%
- Negative predictive value –97%

IV. Discussion

Thyroid nodules are a common clinical problem and FNAC of the thyroid is the key preoperative investigation of thyroid lesions. Fortunately, the vast majority of nodules are benign, but when they are discovered, an assessment regarding the need to exclude malignancy using FNA be performed .it helps to determine whether surgical removal of a detected nodule is recommended or not. The data shows that, introduction of the new simplified Bethesda thyroid reporting system into six categories logically relates to the prognosis of thyroid disease may increase reproducibility of diagnosis. Each diagnosis category conveys specific risks of malignancy, which offers guidance for patient management. The reporting is based upon number of stepwise descriptions.

The Bethesda system for reporting thyroid cytopathology is a standardised reporting system for classifying thyroid fine – needle aspiration results comprising of six diagnostic categories with unique risks of malignancy and recommendations for clinical management like

- Non diagnostic
- Benign
- Aspirates of atypia / follicular lesion of undetermined significance
- Follicular neoplasm / suspicious for a follicular neoplasm
- Suspicious for malignancy
- Malignant aspirates

The vast array of diagnostic nomenclature currently is use can usually be made to fit into these systems and thus easily explained to clinicians. The sensitivity 89%, Specificity 90%, Positive predictive value 69% and Negative predictive value 97%.

V. Conclusion

Adapting the Bethesda system of reporting has led to a high to sensitivity, specificity and high negative predictive values. Data support FNAC as initial management. Inter observer variability is reduced by adopting Bethesda system of reporting. Use of Bethesda systems helps in the prognosis, management and minimizes the unnecessary surgical procedures of thyroid swelling. The relative risk of malignancy is implicit in the proposed probabilistic classification.

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Table – 1: Distribution of cases as per conventional method of reporting

cytopathology	**Number**	**Histopathology**		**Total**
		Benign	**Malignant**	
Non- diagnostic / Unsatisfactory	07	Excluded	Excluded	07
Colloid goitre	100	95	05	100
Colloid cyst	42	40	02	42
Lymphocytic thyroiditis	32	31	01	32
Granulomatous thyroiditis	05	05	00	05
Follicular lesion /Neoplasms	15	12	03	15
Intermediate	10	08	02	10
Suspicious for malignancy	10	04	06	10
Malignant lesions	16	00	16	16
Totals	237	19535		237

Table – 2 Distribution of cases as per Bethesda system of reporting

Cytopathology	Number	Histopathology		Total
		Benign	Malignant	
Non-diagnostic /Unstisfactort	07	Excuded	Excluded	07
Benign	202	200	02	202
Atypia of undetermined significance	00	00	00	00
Follicular Neoplasm	18	07	11	18
Suspicious of malignancy	05	02	03	05
Malignant	05	00	05	05
Total	237	209	31	237

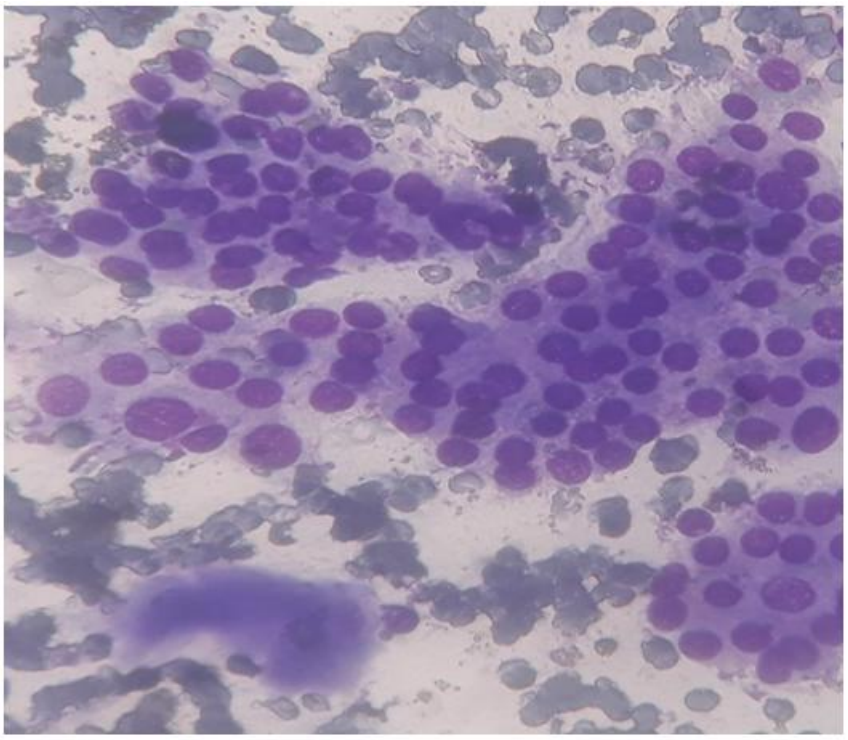

Fig.1. LGX40, COLLOID GOITRE

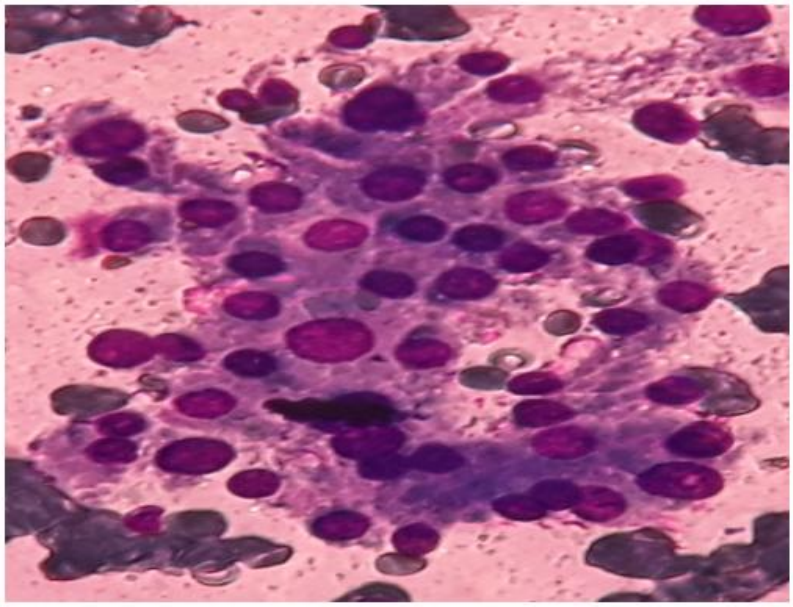

Fig.2. LGX40, LYMPHOCYTIC THYROIDITIS

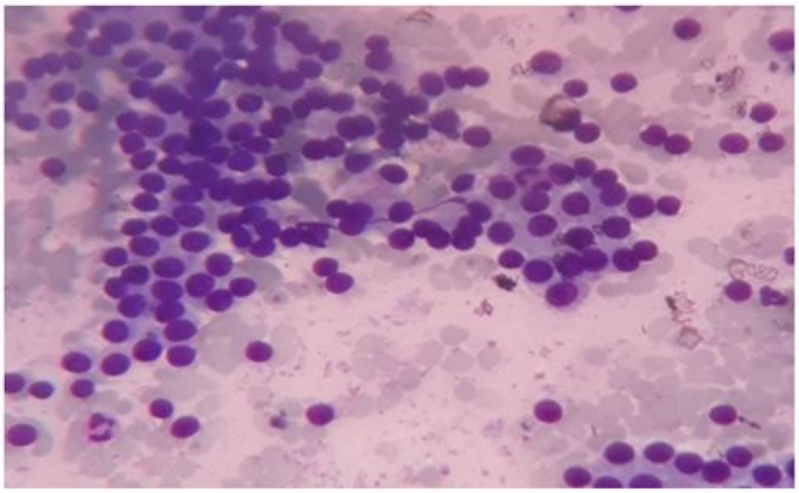

Fig.3. LGX40, FOLLICULAR NEOPLASM

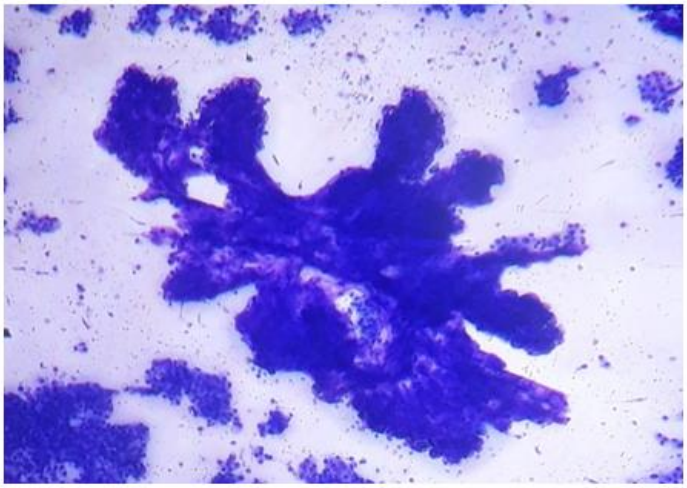

Fig.4. LGX10, PAPILLARY CARCINOMA

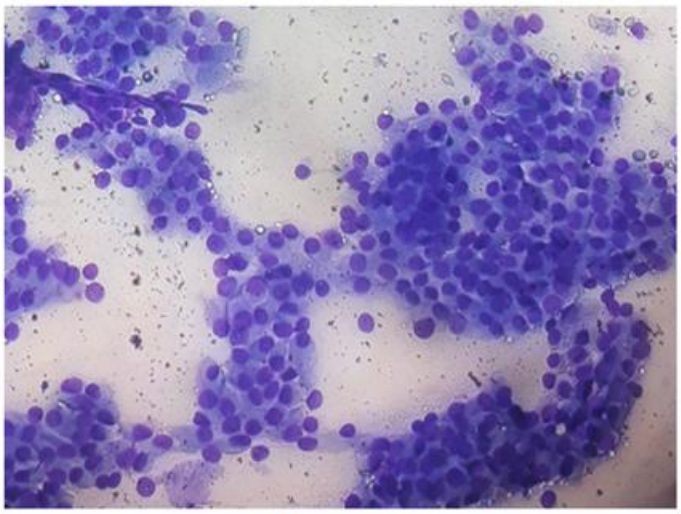

Fig.5.LGX40, PAPILLARY CARCINOMA

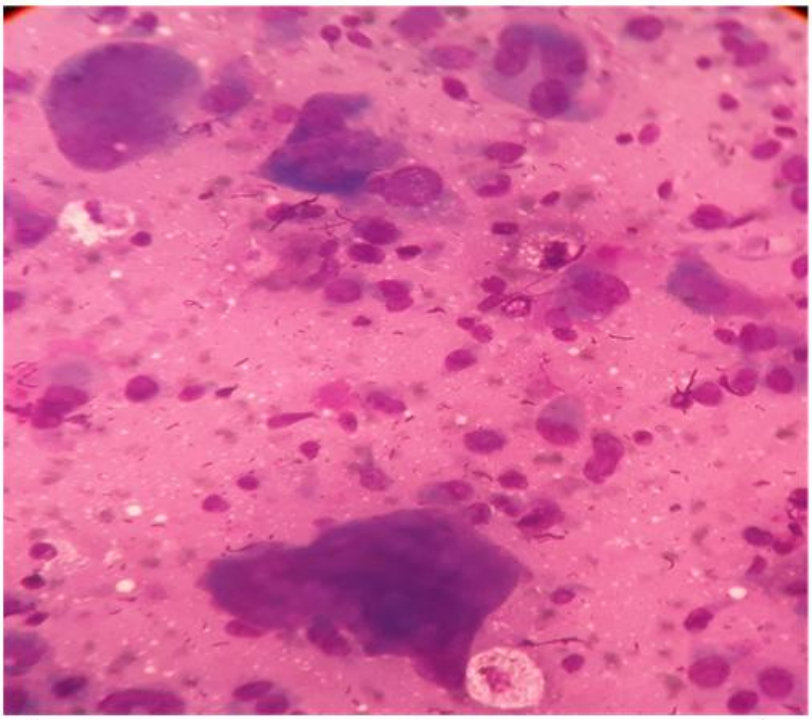

Fig LGX40 Medullary carcinoma

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