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Original Research Article

Application of Scoring System in FNAC of Thyroid Lesions

Namita Kumari[1], Mahesh Prasad[2]

[1]Tutor, Department of Pathology, Sri Krishna Medical College, Muzaffarpur, Bihar
[2]Associate Professor and Head of Department, Department of Pathology, Sri Krishna Medical College, Muzaffarpur, Bihar

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Corresponding author: Dr. Mahesh Prasad
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Abstract:

Background: Giving thyroid lesions' cytology/FNA results a score can provide crucial details about their neoplastic or non-neoplastic status. The goal of the current study was to classify thyroid lesions on aspirates according to established cytological criteria and evaluate them based on numerous parameters. The two cytological classification systems (Cytological score and Standard technique) were compared during histopathology.

Methods: A cytological score and classification were given to 49 cases of thyroid lesions having a preoperative cytologic diagnosis. The association between the cytologic score and the histology was established using the Spearman correlation coefficient after statistical analysis and comparison of the histopathology diagnoses were conducted. To determine the importance of each cytological score, regression analysis was used.

Results: The amount of colloid, nuclear characteristics, and background pattern were found to be the most significant cytologic features by multivariate analysis. Compared to the traditional cyto categorization with histopathology, there was a higher degree of correlation between the scoring techniques on cytology and histopathology. The ratings awarded to the cytologic and histopathologic specimens showed a strong relationship ($p < 0.001$) with one another.

Conclusion: Since histology and categorization systems have a close link, thyroid lesions can be evaluated using a cytological scoring approach.

Keywords: FNAC, Cytological scoring, Statistical analysis.

Introduction

Thyroid lesion has become the second most prevalent endocrine disorder, the incidence of palpable thyroid is about 20% in iodine – insufficient area. Fine needle aspiration cytology (FNAC) is currently being used more frequently to diagnose thyroid abnormalities prior to surgery. It is used to classify patients into those who need surgery and those who do not by dividing them into groups that are minimally invasive, cost-effective, and have few consequences.

Even so, some unfavorable findings remain hidden by errors in sampling, screening, and interpretation. It could be made more valuable through assessment using all the attributes that are accessible. If used, such scoring might significantly reduce interobserver variation. This scoring approach, which is helpful to clinicians, may effectively assess cytological diagnosis in thyroid lesions.[1-4]

In order to classify the lesions on FNAC and forecast its potential histological diagnosis, additional research is required to look into and make use of all the information on the smear that is now accessible. In industrialized nations, morphometry-based scoring systems have been used on a greater scale for Vaginal Pap smears, but research is still in its early stages with regard to other cytological diseases.[1,5,6]

Material and Methods

This prospective study, which covered 49 histopathology cases of thyroid lesions with preoperative cytological diagnoses, was carried out at the pathology department of Sri Krishna Medical College, Muzaffarpur, Bihar from November 2022 to April 2023. The study examined cases where both adequate cytological and histopathological data were available. Cases with unavailable histology or inadequate cytology were omitted from the study. H&E, Papanicolaou, and Giemsa stains were all used to stain the aspirate smears.

Numbers and percentages were used to represent the descriptive data. For the purpose of evaluating the importance of various cytological parameters, multiple regression analysis was conducted.

The Chi-square test was used to determine whether there is any association between the various grading

systems. Kappa measure of agreement was used to evaluate agreement. By using Spearman's correlation coefficient, the relationship between cytological and histological grading was investigated. For statistical significance, a p-value of 0.05 or less was taken into consideration.

Results

A total of 35 female and 14 male patients between the ages of 22 and 58 participated in the study. The right lobe was mostly affected. Lesions ranged in size from 0.5 cm to 5 cm at their widest point. The bulk of the 49 cases aspirated were non-neoplastic lesions. Compared to the scoring system, a high percentage of lesions were classified as benign by standard categorization. A higher percentage of the lesions were benign, according to histopathology. Undetermined significance follicular neoplasms and atypias were classified as indeterminate lesions rather than benign lesions. In our investigation, there were hardly any malignant lesions. (Table 1)

Table 1: Distribution of cases

Category	Scoring system	Standard classification	Histopathology
I	36 (73.46%)	28 (57.14%)	36 (73.46%)
II	10 (20.41%)	18 (36.73%)	8 (16.33%)
III	3 (6.12%)	3 (6.12%)	5 (10.20%)
Total	49 (100.0%)	49 (100.0%)	49 (100.0%)

The results of a multivariate examination of the scoring system's constituent parts showed that factors including colloid, nuclear pleomorphism, and background pattern each individually contribute to diagnosis.
In 90.3% of the cases, both diagnostic procedures yielded a perfect diagnosis. The connection between scoring cytological method and histopathology was 89.79%, whereas the correlation between the standard cytologic method and histopathology was 73.46% overall. (Table 2, 3, 4)

Table 2: Comparison of cytological grade – scoring system with standard classification

Cyto Scoring	Cyto Standard			Total
	Non-neoplastic	Benign	Malignant	
Non-neoplastic	33	2	1	36
Benign	2	6	1	9
Malignant	1	1	2	4
Total	36	9	4	49

Spearman correlation: 0.376, Standard error: 0.67, Agreement: 90.3%, P < 0.001 (Significant)

Table 3: Comparison of scoring system with histopathology

Cyto scoring	Histopathology			Total
	Non-neoplastic	Benign	Malignant	
Non-neoplastic	34	1	1	36
Benign	2	7	1	10
Malignant	0	1	2	3
Total	36	9	4	49

Spearman correlation: 0.465, Standard error: 0.051, Agreement: 90.81%, P < 0.001 (Significant)

Table 4: Comparison of cytological grade – standard cyto system with histopathology

Cyto standard	Histopathology			Total
	Non-neoplastic	Benign	Malignant	
Non-neoplastic	26	1	1	28
Benign	10	7	1	18
Malignant	0	0	3	3
Total	36	8	5	49

Spearman correlation: 0.639, Standard error: 0.076, Agreement: 73.97%, P < 0.001 (Significant)

The scoring system and the reference system have a good correlation. The scoring system and histology had a good relationship. The considerable and pronounced link between the diagnosis on the cytology and histology specimens was demonstrated by the high co-efficient of correlation (P <0.001). (Table 5)

Table 5: Test showing correlation and significance between various lesions

Paired Samples Correlations			
Categories correlated	N	Correlation	Sig.
C – Scoring & C – Standard	49	0.603	0.000
C – Scoring & Histopathology	49	0.762	0.000
C – Standard & Histopathology	49	0.662	0.000

The existence of a benign diagnosis and the two criteria considered in the scoring technique, namely colloid and background pattern, showed a significant association.

For 2% of instances using the Scoring-cyto method, 8% of cases using the Standard-cyto method, and 4% of cases using the standard histopathology diagnosis, the two observers assigned different grades. Kappa measure of agreement, $\kappa = 0.89$ ($p<0.001$).

Discussion

The fastest-rising cancer among women in the United States is currently thought to be thyroid cancer, which accounts for around 2% of all cancer cases but is still rarer than breast or lung cancer in terms of incidence. Better screening and knowledge of thyroid cancer's early warning symptoms are likely contributing factors in the incidence increase. Many thyroid cancer patients in the past did not receive prompt adequate diagnosis, and some of these tumours went unnoticed until they were extremely aggressive and challenging to treat. Low cellularity, increased bleeding, and difficulties identifying colloid in FNA smears were the main causes of the discrepancies in cytology and histology in some cases.[7-12]

To make the right diagnosis, histopathological practice is crucial. Numerous immuno indicators, or serology, that really represent biological continuum, have been developed as a result of this tendency.[13-15]

It is commonly known that histology is valuable. Since FNAC is frequently used to diagnose thyroid lesions, it would be more informative to use a score approach when managing the patient.[16,17]

The most important characteristics in the scoring system were the colloid, follicular cell pattern, and backdrop.

Colloid, especially if thick, presents as a crackling artifact and can be found in minute amounts in a variety of pathologies, including thyroiditis, neoplasms, papillary carcinoma, and goitre. The distinctive colloid found in papillary carcinoma is chewing gum colloid. Thick Colloid, especially when observed under a microscope where it appears as varnish on the slide, is a trustworthy indicator of benignity and not a characteristic that is typically reported to be linked to cancer.[7,10]

The definition of a smear's sufficiency by cellularity is diverse and non-standardized. Different research provide various criteria. The majority of investigations, in which sufficiency is precisely defined and the follicular cells are identified, indicate that 5–6 follicle groups, each with at least 10 cells, are the minimal requirements for adequacy; nevertheless, each case must be assessed in the light of the clinical and radiological data available. The majority of follicular cells were discovered in sheets. They were dispersed in cystic change instances. In several cases, micro-follicles were noted but later revealed to be follicular adenomas. As well-defined glandular structures with lumens that are either empty or have inspissated colloid, microfollicles have the appearance of being glandular. Recognition of abundant colloid should override the requirement of a set number of follicular cells as the follicular cells might be zero in some cases.[7,10,17]

Background pattern usually implies non-neoplastic lesion and minimal bleeding is typical. The majority of colloid-rich backgrounds are benign, however caution must be exercised because malignant lesions can sometimes present with mild colloid levels. Colloid identification challenges may contribute to cytology overdiagnosis. Colloid has a varying density and reacts differently with various stains in terms of color. With MGG, it typically stains blue, but with Pap, it can also stain pink, violet, blue, or a light grey green. When mixed with blood, thin colloid is difficult to distinguish from serum and other proteinaceous material in the absence of the typical crackling artifact pattern.8,10

The cytological features employed simultaneously in histopathology to assess thyroid lesion diagnosis are colloids, follicles, and nuclear features.

To differentiate between Hurthle cell adenoma and Hurthle cell lesions like Hashimoto's thyroiditis, serology may be helpful. Immune-marker use is now pricey and not cost-effective. However, its objectivity and sensitivity may prove helpful in the future.[14,15-18]

Higher nuclear pleomorphic lesions (thyroid tumors) were found to have higher bleeding.

Increased microfollicle counts in the presence of hemorrhage should always be seen as a sign of a neoplastic lesion since hemorrhage is a sign of a neoplastic lesion. Blood can accumulate in the smears due to inexperienced hands and an excruciatingly slow technique, increasing the likelihood that the lesion will be classified as malignant.

If performed by a skilled cytologist, the risk of neoplasia usually rises with the volume of blood.

An noteworthy discovery is angiogenesis-related bleeding. For the diagnosis of malignant lesions, this might be helpful.[8,9,19]

FNA primary function is to distinguish between malignant and benign lesions and prioritize the cases. To maximize the diagnostic sensitivity of this method, pathologists and physicians must work closely together and communicate often. It is crucial for pathologists to thoroughly go over the

slides, talk to the doctors about benign tumors discovered with FNA, and, if necessary, advise biopsy or resection of cystic lesions. We should be aware that the location of the mass, the kind of the lesion, and the aspirator's and cytopathologist's level of competence, as well as other factors, all affect how accurate a diagnosis may be made with FNA.[2,3,20]

The results of the current study demonstrated that thyroid lesions can be identified using aspiration, and cytological score correlates with histological diagnosis.

With very few exceptions and depending on sample size limits, the scoring system is straightforward, quick, reproducible, and exactly correlates with histology.

Our study suggests using the scoring system since it is straightforward to replicate and has a stronger connection with histology than the other two systems.

Cytological scoring is simple to administer and correlates well with histopathology, hence it should be used as much as possible in FNAC reports to anticipate histological diagnosis prior to surgery.

Conclusion

The scoring system provide quick easy method to assess the probability of malignancy in the preoperative period and there is quantified information.

The most significant FNAC service we can offer to our clinical colleagues is a cyto-diagnosis that is almost always accurate. Because in many clinical scenarios the cytological and histopathological specimens will be signed out by various pathologists, it is practical that one pathologist's cytological score can predict another pathologist's histological diagnosis.

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