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A STUDY OF RADIOLOGICAL AND PATHOLOGICAL CORRELATION OF THYROID MASSES.

Radiodiagnosis

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ABSTRACT

Objective. To determine the role of radiological-pathological correlation in reducing false negative results of fine-needle aspiration (FNA) at thyroid nodules. Methods. This retrospective study included 307 nodules 1 cm or larger in 302 patients diagnosed as benign at initial cytologic evaluation and that underwent follow-up ultrasound (US) or FNA. We compared the risk of malignancy of nodules classified into subgroups according to the initial US features and imaging-cytology correlation. Results. Among included nodules, 7 nodules were proven to be malignant (2.3%) in follow-up FNA or surgery. When a thyroid nodule had discordant US findings on image review after having benign FNA results, malignancy rate increased to 23.3%, significantly higher than that of nodules with suspicious US features ($P < 0.001$). Conclusions. Repeat FNA can be effectively limited to patients with cytologically benign thyroid nodules showing discordance in imaging-cytology correlation after initial biopsy, which reduces unnecessary repeat aspirations.

KEYWORDS

thyroid, radiology

INTRODUCTION-

The treatment plans for thyroid nodules is based on the Bethesda system, the most generally accepted system for reporting thyroid cytology, the "benign" category implies a less than 3% risk of malignancy Repeat FNA is recommended when a nodule shows significant growth or morphologic transformation with "suspicious" US features on follow-up [1, 2]. However, the practical risk of malignancy in nodules with benign cytology varies in each institute, ranging from 2% to 18% [3], and it has even been reported to have gone up to 62% [4]. Therefore, some investigators recommend routine repeat FNA for thyroid nodules with benign cytology [5, 6].

Considering cost-effectiveness and diagnostic value, repeat FNA has been considered when the nodule shows any suspicious feature on the initial US [7, 8].

Radiologists specialized in breast imaging have been confronted with the same problem in the core needle biopsy of a breast lesion. Correlation of pathologic results with sonographic findings has been used in some institutions to verify that the lesion was adequately sampled. Discordant benign breast nodules are recommended for rebiopsy to confirm the diagnosis. This approach was suggested owing to the wide range of false negative rates of this category [9]. Based on different malignancy rates of suspicious US features in thyroid nodules and considering approaching steps in management of breast lesions, we conjecture that an imaging-cytology correlation can be a better diagnostic approach for patient management than initial US features in a thyroid nodule with benign cytology. Therefore, we investigated the role of imaging-cytology correlation to reduce the false negative rates of cytology at thyroid nodules as compared with the use of initial US features.

MATERIAL AND METHODS-

This was a hospital based retrospective observational study in which a total of 307 nodules in 302 patients were studied from January 2017 to December 2018 who satisfied the inclusion and exclusion criteria in the department of radiology in a tertiary teaching hospital in central india.

Inclusion criteria:

1. they were equal to or larger than 1 cm
2. they underwent further evaluation such as follow-up US, follow-up FNA, or thyroid surgery.
3. there were available radiologic reports that in5cluded an additional radiologist's opinion about the concordance or discordance between imaging and cytologic results in postbiopsy

Significance was assumed when the two-sided P value was less than .05. Logistic regression analysis was performed to assess the odds ratio for the risk of malignancy. Odds ratios with relative 95% confidence intervals (CIs) were also calculated.

RESULTS-

Among 307 nodules studied in this study of benign cytology, 300 nodules were benign (97.7%) and 7 nodules were malignant (2.3%) based on cytopathology (Table 1). The mean age of patients with malignant nodules was not significantly different from that of patients with benign nodules ($P = 0.25$). Gender of patients was not associated with malignancy ($P = 0.563$). The mean size of malignant nodules (18.1 ± 12.3 mm) was not significantly different from that of benign nodules (20.5 ± 10.2 mm, $P = 0.35$). There were 40 nodules with initial suspicious US features and 267 nodules without initial suspicious US features. The risk of malignancy was higher in nodules with initial suspicious US features (10.%, 4 of 40) than in nodules without initial suspicious US features (1.12%, 3 of 267; $P < 0.001$, Table 1).

The mean age of patients with included nodules was statistically different from the other patients (48.9 ± 11.6 versus 50.6 ± 12.8 years; $P = 0.03$). Patient gender ($P = 0.42$) and mean nodule size ($P = 0.58$) were not significantly different between included and excluded nodules. (table 2).

When comparing the risk of malignancy between benign cytology alone and each subgroup by a combination of benign cytology with initial US findings or post-biopsy concordance, all combinations had significantly different risk values from cytology alone (Table 3,)

DISCUSSION-

As we know that Diagnosing and treating thyroid masses is based on pathological findings mostly. Although FNA is a widely used tool for the diagnosis of thyroid nodules, the most significant problem it has is false negative results which bring out misses and delays in treatment of the cancer [10]. Errors in cytologic reports have arisen from the

overinterpretation of nondiagnostic specimens as diagnostic ones [11, 12]. Therefore, many reports discussed the differentiation of a nondiagnostic specimen from a diagnostic one in the cytologic interpretation of thyroid FNA [1]. Diagnostic errors of thyroid FNA can also be caused by the mistakes of cytopathologists and the inherent nature of thyroid nodules due to overlapping cytologic criteria among hyperplastic adenomatoid nodule in goiter, follicular adenoma, well-differentiated follicular carcinoma, and follicular variant of papillary carcinoma [13].

To reduce false negative results of thyroid FNAs, there have been two suggested approaches; first, routine repeat FNA in thyroid nodules with benign cytology [14, 15] and, second, selective repeat FNA [6, 8]. In the aspect of cost-effectiveness, it is more rational to consider performing follow-up FNA selectively for nodules with a high-risk of malignancy rather than performing a total inspection of cytologically benign nodules in initial FNA. Based on several reports, the rate of malignancy in benign thyroid nodules with suspicious US features was 3.7–47.1% which was significantly higher than that of benign thyroid nodules without suspicious US features [7].

In this study, 2.3% of nodules with benign cytology in initial FNA were finally proven to be malignant. As expected, the malignancy rate of thyroid nodules (10%) with suspicious features on initial US was significantly higher than that of nodules (1.12%) without suspicious features on initial US, and the malignancy rate of nodules (23.3%) with discordant imaging findings was also significantly higher compared to concordant nodules (0.6%) in postbiopsy imaging-cytologic correlations. Furthermore, the rate of malignancy was higher in the nodules showing imaging-cytology discordance compared to nodules showing suspicious feature on the initial US. However, there was no significant difference in the risk of malignancy between concordant nodules in postbiopsy correlation and nodules without suspicious features on initial US.

There were several limitations to this study. First, some nodules were excluded in analysis despite having benign cytologic results due to loss of follow-up and absence of additional reports. Selection bias may be unavoidable. However, the initial US assessment was not significantly different between included nodules and excluded nodules which were 1 cm or larger with benign cytology in the initial FNA. Second, interobserver and intraobserver variability among radiologists are possible in the interpretation of US images and among cytologists, especially when reviewing follicular lesions.

CONCLUSION-

Thus we conclude that Repeat FNA can be effectively limited to patients with cytologically benign thyroid nodules showing discordance in imaging-cytology correlation, which reduces unnecessary repeat aspirations as well as decreasing false negative results.

Tables and charts:

Table 1: SHOWING BASELINE CHARACTERISTICS OF 307 THYROID NODULES

Characteristic	Benign	Malignant	P value
Number of nodules	300	7	
Mean age (years)	48.2 ± 12.2	53.0 ± 11.3	0.25
Gender Male Female	42 (14.0) 258 (86.0)	1 (14.3) 6 (85.7)	0.563
Mean nodule size (mm)	20.5 ± 10.2	18.1 ± 12.3	0.35
US final assessment before FNA Probably benign Suspicios malignant	266 (88.7) 34 (11.3)	2 (28.57) 5 (71.42)	<0.001

Table 2: SHOWING Comparison of baseline characteristics of nodules according to inclusion criteria among 1 cm or larger 561 thyroid nodules.

Characteristic	Included nodules	Excluded nodules	P value
Number of nodules	307	254	
Mean age (years)	48.9 ± 11.6	50.6 ± 12.8	0.03
Gender Male Female	43 (14.01) 264 (85.99)	36 (14.17) 218 (85.8)	0.42
Mean nodule size (mm)	19.9 ± 10.2	20.0 ± 10.5	0.58
US final assessment before FNA Probably benign Suspicios malignant	267 (86.9) 40 (13.1)	222 (87.4) 32 (12.6)	0.81

Data in parentheses are percentages.

Table 3: Showing risk of malignancy according to initial US features and imaging-cytologic correlation in thyroid nodules.

Characteristic	Number of nodules	Number of malignant nodules	Risk of malignancy (%)
Benign cytology alone	307	7	2.28 (0.9, 2.9)
Initial no suspicious US	267	3	1.12 (0.3, 1.8)
Initial suspicious US	40	4	10 (6.1, 22.4)
Concordant lesion to benign cytology in post biopsy correlation	287	2	0.6 (0.2, 1.6)
Discordant lesion to benign cytology in post biopsy correlation	20	5	23.3 (9.9, 42.3)

Data in parentheses are 95% confidence intervals.

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