



An Analysis of Thyroid Fine Needle Aspiration Biopsy Results According to the Bethesda System for Reporting Thyroid Cytopathology: A Cross-Sectional Retrospective Study

Tiroid İnce İğne Aspirasyon Biyopsi Sonuçlarının Tiroid Sitopatolojisini Raporlamak İçin Bethesda Sistemine Göre Analizi: Kesitsel Retrospektif Bir Çalışma

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Abstract

Aim: Thyroid fine needle aspiration biopsy (TFNAB) is an effective and convenient evaluation method. It is the gold standard in preoperative evaluation. The Bethesda System for Reporting Thyroid Cytopathology is a standardized evaluation system that has been widely used all over the world. In this study, we aimed to investigate the compatibility of the TFNAB results, which we evaluated according to the Bethesda System for Reporting Thyroid Cytopathology.

Material and Method: The data of 333(236 female, 97 male) patients, who underwent TFNAB between January 2020 and January 2022, were collected retrospectively. Their Bethesda categories, ages, and gender characteristics were recorded.

Results: The mean age for the 333 patients included in the study was 46.46±14.53 for the female patients and 50.19±10.06 for the male patients. When all patients were examined, B1 and B2 were the most common cytologies. While benign cytology was observed at an earlier age, the suspicion of malignancy or the incidence of malignant cytology increased as the mean age of the patients increased.

Conclusion: The Bethesda System for Reporting Thyroid Cytopathology is a widely accepted and reliable benchmark around the world in the evaluation phase of the cytopathological examination. In this study, we examined the cytopathological evaluation results of the patients who underwent thyroid FNAB at our center according to the Bethesda System for Reporting Thyroid Cytopathology. In terms of diagnostic cytology, we recommend a USG-guided biopsy performed by an experienced clinician.

Keywords: Thyroid fine needle aspiration biopsy, the Bethesda system, thyroid cytopathology

Öz

Amaç: Tiroidin ince iğne aspirasyon biyopsisi etkili ve kullanılabilir bir değerlendirme yöntemidir. Preoperatif değerlendirmede altın standarttır. Tiroid sitopatolojisini raporlamak için Bethesda Sistemi, tüm dünyada yaygın olarak kullanılan standartlaştırılmış bir değerlendirme sistemidir. Bu çalışmada Bethesda Sistemi'ne göre değerlendirdiğimiz ince iğne aspirasyon biyopsisi sonuçlarının uyumluluğunu araştırmayı amaçladık.

Gereç ve Yöntem: Ocak 2020-Ocak 2022 tarihleri arasında ince iğne aspirasyon biyopsisi uygulanan 333 (236 kadın, 97 erkek) hastanın verileri geriye dönük olarak toplandı. Bethesda kategorileri, yaşları ve cinsiyet özellikleri kaydedildi.

Bulgular: Çalışmaya alınan 333 hastanın yaş ortalaması kadın hastalarda 46,46±14,53, erkek hastalarda 50,19±10,06 idi. Tüm hastalar incelendiğinde Non diagnostic (B1), Benign (B2) en sık görülen sitolojilerdi. Benign sitoloji daha erken yaşlarda görülürken hastaların yaş ortalaması arttıkça malignite şüphesi veya malign sitoloji görülme sıklığı artmaktaydı.

Sonuç: Tiroid sitolojisini raporlamak için Bethesda Sistemi sitopatolojik incelemenin değerlendirme aşamasında dünya çapında yaygın olarak kabul gören güvenilir bir kriterdir. Bu çalışmada merkezimizde ince iğne aspirasyon biyopsisi uygulanan hastaların sitopatolojik değerlendirme sonuçlarını Bethesda Sistemi'ne göre inceledik. Tanısal sitoloji açısından deneyimli bir klinisyen tarafından alınan ultrasonografi eşliğinde biyopsi yapılmasını öneriyoruz.

Anahtar Kelimeler: Tiroid ince iğne aspirasyon biyopsisi, Bethesda sistemi, tiroid sitopatolojisi



INTRODUCTION

The thyroid nodule is a common health problem today, and its frequency in adults has been reported to be 4–7% on average in cases detected through palpation and 67% in ultrasound scans.^[1] Thyroid fine needle aspiration biopsy (TFNAB) is an effective and convenient evaluation method frequently used in the follow-up and evaluation of thyroid nodules due to its ease of application, low cost, and low number of complications.^[2] It is the gold standard in preoperative evaluation.^[3]

The Bethesda System for Reporting Thyroid Cytopathology is a standardized evaluation system that has been widely used all over the world since 2009 in the evaluation of TFNAB, and it has enabled a correlation between clinicians and pathologists.^[4] The Bethesda System for Reporting Thyroid Cytopathology consists of 6 diagnostic categories, which are non-diagnostic/unsatisfactory (ND), benign cytology (BC), atypia of undetermined significance/follicular lesion (FLUS), follicular neoplasm or suspicious for follicular neoplasm (FN), cytology suspicious for malignancy (SFN), and malignant cytology (MC).^[4]

In this study, we aimed to investigate the compatibility of the TFNAB results, which we evaluated according to the Bethesda System for Reporting Thyroid Cytopathology.

MATERIAL AND METHOD

Approval of the ethics committee was obtained from Mardin Artuklu University prior to the study (Date: 08/03/2022 - No:2022-6). The data of 333 patients, who underwent TFNAB between January 2020 and January 2022, were collected retrospectively. Their Bethesda categories, ages, and gender characteristics were recorded. Biopsy procedures on the patients were performed by a radiologist or endocrinologist with ultrasonography (USG) or by a general surgeon or an ENT specialist without USG. An evaluation of their biopsy procedures had been reported by the relevant department in the same hospital. Their biopsy results were classified according to Bethesda categories. The categories were as follows:

1. Nondiagnostic (B1),
2. Benign (B2),
3. Atypia of undetermined significance or follicular lesion of undetermined significance (B3),
4. Follicular neoplasm or suspicious for follicular neoplasm (B4),
5. Suspicious for malignancy (B5),
6. Malignant (B6).

Statistical Analysis

The IBM SPSS 21.0 for Windows statistical package software was used in the statistical evaluation of our research data. Measured variables were presented as mean±standard deviation and median value, and categorical variables were presented as numbers and percentages (%). The data were

checked in terms of conforming to the normal distribution. Kruskal Wallis H Test was used to compare non-normally distributed groupings with multiple options. A Bonferroni correction was performed for post-hoc analysis. The Mann-Whitney U Test was used to compare the groupings with two options. Intergroup comparison of qualitative variables was performed using the Chi-square test. The hypotheses were bidirectional, and the results were considered statistically significant at $p < 0.05$.

RESULTS

The mean age for the 333 patients (236 female, 97 male) included in the study was 46.46 ± 14.53 for the female patients and 50.19 ± 10.06 for the male patients. The B2, B1, and B3 were the most common cytologies among females, respectively. Among the male patients, the B1, B5, B2 and B3 were the most common cytology, respectively, and the B2 and B3 were observed in equal proportions (**Table 1**).

Table 1: Comparison of diagnosis groups in terms of gender variable according to Bethesda cytopathology classification

	Female (n)(%)	Male (n)(%)	Total	p
B1	72 (52.2%)	66 (47.8%)	138	
B2	88 (90.7%)	9 (9.3%)	97	
B3	45 (83.3%)	9 (16.7%)	54	
B4	12 (100%)	0 (0%)	12	<0.001
B5	13 (56.5%)	10 (43.5%)	23	
B6	6 (66.7%)	3 (33.3%)	9	
Total	236 (70.9%)	97 (29.1%)	333	

Nondiagnostic (B1), benign (B2), atypia of undetermined significance or follicular lesion of undetermined significance (B3), follicular neoplasm or suspicious for follicular neoplasm (B4), suspicious for malignancy (B5), malignant (B6) p: significance value of the Chi-Square test

When all patients were examined, B1, B2 and B3 were the most common cytologies (**Table 2**).

Table 2: Comparison of patient numbers according to Bethesda cytopathology classification

	B1	B2	B3	B4	B5	B6	P
N (%)	138 (41.4%)	97 (29.1%)	54 (16.2%)	12 (3.6%)	23 (6.9%)	9 (2.7%)	<0.001

N: Number, Nondiagnostic (B1), Benign (B2), Atypia of undetermined significance or follicular lesion of undetermined significance (B3), follicular neoplasm or suspicious for follicular neoplasm (B4), Suspicious for malignancy (B5), Malignant (B6) p: significance value of the Chi-square test

While benign cytology was observed at an earlier age, the suspicion of malignancy or the incidence of malignant cytology increased as the mean age of the patients increased (**Table 3**).

Table 3: Comparison of diagnosis groups in terms of age variable according to Bethesda cytopathology classification

	B1	B2	B3	B4	B5	B6	P
Age (median) (years)	47.00	39.00	55.50	45.00	71.00	56.00	<0.001 PB2-B3<0.001 PB2-B5<0.001

Nondiagnostic (B1), Benign (B2), Atypia of undetermined significance or follicular lesion of undetermined significance (B3), follicular neoplasm or suspicious for follicular neoplasm (B4), Suspicious for malignancy (B5), Malignant (B6) p: significance value of the Kruskal-Wallis test

DISCUSSION

In the evaluation of thyroid fine needle aspiration biopsy, The Bethesda System for Reporting Thyroid Cytopathology is the most appropriate cytopathology evaluation system of FNAB in terms of evaluating thyroid malignancies.^[5] According to the American Thyroid Academy (ATA), FNAB should be performed on nodules of 1 cm or greater in highly or moderately suspicious lesions, 1.5 cm or more in low suspicions, and 2 cm or more in very low suspicions, while FNAB should not be recommended for nodules smaller than 1 cm.^[6] ATA recommends repeating the USG-guided biopsy in the nondiagnostic group and making a follow-up or surgical decision in case a diagnosis cannot be made. In addition, according to the ATA, benign FNAB does not require intervention in terms of diagnosis or treatment, and nodules with benign cytology twice may not be followed up with USG.^[6] In this study, the total frequency of B3, B4, and B5 cytology was evaluated at 20–25%, and B5 was the least common cytological diagnosis.

According to the Bethesda cytological reporting system, B1 is between 2-20%, while the ideal is below 10%.^[7] In the same study, while the rate of benign cytology was 60-70%, the rate of malignant cytology was 0-3% in all cases.^[7] It has been reported that nondiagnostic diagnosis rates decrease by 50% when thyroid FNAB is performed with an accurate technique and accompanied by USG.^[6] It is more difficult to obtain biopsy material with a high diagnostic value from mixed and cystic nodules.^[8] In their study evaluating the cytopathology results of the USG-guided FNAB for macro-calcified thyroid nodules, Koc et al. encountered B1 cytology at a rate of 19.2% and explained the reason as the inability to aspirate sufficient cells from the calcified area.^[9] In other studies, it was emphasized that the rate of B1 cytology varied between 55-74% of the cytology examinations, while the rate of B4-B5 cytology varied between 2-5%. In our study, B1 cytopathology was the most common (41.4%), followed by B2 as the most common diagnostic cytology. We believe the frequency rate of nondiagnostic diagnosis was higher compared to the literature due to the fact that not all samples were obtained with USG in our hospital.

In their study investigating the Bethesda categories of 366 patients who underwent thyroidectomy, Ocak et al. reported category 1 in 6.3% of the patients, category 2 in 21.6% of the patients, category 3 in 35% of the patients, category 4 in 30.9% of the patients, category 5 in 3.8% of the patients, and category 6 in 2.5% of the patients.^[12] In this study, the researchers evaluated the Bethesda category of patients who underwent surgery, and the most common diagnoses were Bethesda 3 and 4. In our study, B2 (29.1%) and B3 (16.2%) diagnostic cytology were the most common diagnostic diagnoses. In our study, the frequency of other cytopathological diagnoses was 3.6% for B4 cytology, 6.9% for B5 cytology, and 2.7% for B6 cytology.

Many researchers have stated that thyroid lesions are associated with age and gender.^[13,14] Sinna et al. reported in their study that thyroid nodules are more common in women and the frequency of malignant nodules increases with age of over 45 years.^[13] In our study, there was a female predominance and the female-to-male ratio was 2.43. Additionally, in our study the suspicion of malignancy or the incidence of malignant cytology increased as the mean age of the patients increased.

CONCLUSION

Thyroid FNAB is an easy-to-apply and cost-effective method with few complications and is a common method used in the follow-up of thyroid nodules and before surgery. The Bethesda System for Reporting Thyroid Cytopathology is a widely accepted and reliable benchmark around the world in the evaluation phase of the cytopathological examination. In this study, we examined the cytopathological evaluation results of the patients who underwent thyroid FNAB at our center according to the Bethesda System for Reporting Thyroid Cytopathology. In terms of diagnostic cytology, we recommend a USG-guided biopsy performed by an experienced clinician.

ETHICAL DECLARATIONS

Ethics Committee Approval: Approval of the ethics committee was obtained from Mardin Artuklu University prior to the study (Date: 08/03/2022 - No:2022-6).

Informed Consent: All participants signed the free and informed consent form.

Referee Evaluation Process: Externally peer-reviewed.

Conflict of Interest Statement: The authors have no conflicts of interest to declare.

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