MAK HILL Publications Research Journal of Medical Sciences

Research Article
doi: 10.59218/makrjms.2023.230.233

Study of Cyto-Histopathological Correlation in Thyroid Lesions

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ABSTRACT
The study of cyto-histopathological correlation in thyroid lesions is of significant importance in the field of diagnostic pathology. Thyroid lesions encompass a broad spectrum of abnormalities, ranging from benign nodules to malignant neoplasms. The accurate diagnosis of these lesions is crucial for appropriate patient management and treatment decisions. This study aims to investigate the correlation between cytological and histopathological findings in thyroid lesions, thereby evaluating the diagnostic accuracy and reliability of fine-needle aspiration cytology (FNAC) as a preoperative diagnostic tool. A retrospective analysis was conducted on a cohort of patients who underwent FNAC followed by thyroidectomy or thyroid biopsy. The cytological and histopathological slides were reviewed independently by experienced pathologists. The cytological diagnoses were categorized into different diagnostic groups based on the Bethesda System for Reporting Thyroid Cytopathology. The histopathological diagnoses were classified according to the World Health Organization classification system for thyroid tumors. The study revealed a high concordance rate between cytological and histopathological diagnoses, indicating a strong correlation between the two modalities. The overall diagnostic accuracy of FNAC in detecting thyroid lesions was found to be substantial. However, the study also identified certain cases where discordance between cytological and histopathological findings occurred, highlighting the limitations and challenges associated with FNAC as a diagnostic technique. This study provides valuable insights into the cyto-histopathological correlation in thyroid lesions. The findings support the use of FNAC as a reliable diagnostic tool for the initial evaluation of thyroid nodules. However, cautious interpretation and recognition of the limitations are essential, as discordance between cytological and histopathological diagnoses can occur. Further research and improvement in cytological techniques are warranted to enhance the accuracy and utility of FNAC in the diagnosis of thyroid lesion.

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Key Words
Cyto-histopathological correlation, thyroid lesions, fine-needle aspiration cytology (FNAC)

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Received: 10 June 2023
Accepted: 15 June 2023
Published: 30 June 2023

Citation: Chappidi Sitalata and Sivajyothsna Suratha, 2023. Study of Cyto- Histopathological Correlation in Thyroid Lesions. Res. J. Med. Sci., 17: 230-233, doi: 10.59218/makrjms.2023.230.233

INTRODUCTION

Thyroid lesions encompass a wide range of abnormalities, including benign nodules and malignant neoplasms. Accurate diagnosis of these lesions is crucial for appropriate patient management and treatment decisions. In recent years, the study of cyto-histopathological correlation has gained significant importance in the field of diagnostic pathology. Cyto-histopathological correlation involves comparing and evaluating the cytological findings obtained through fine-needle aspiration cytology (FNAC) with the subsequent histopathological examination of the surgically resected thyroid specimens. This correlation allows for the assessment of the diagnostic accuracy and reliability of FNAC as a preoperative diagnostic tool[1,2].

Several studies have focused on investigating the concordance and discordance between cytological and histopathological diagnoses in thyroid lesions. These studies aim to determine the overall diagnostic accuracy of FNAC in detecting different types of thyroid lesions, as well as to identify the factors contributing to any discrepancies observed between the two modalities. Understanding the cyto-histopathological correlation in thyroid lesions can help improve the accuracy of preoperative diagnoses and optimize patient care[3,4].

Aim: To assess the diagnostic accuracy and reliability of FNAC as a preoperative diagnostic tool for thyroid lesions.

Objectives:

- To assess the concordance between cytological findings obtained through fine-needle aspiration cytology (FNAC) and subsequent histopathological examination in thyroid lesions
- To evaluate the diagnostic accuracy of FNAC in identifying different types of thyroid lesions, including benign nodules and malignant neoplasms
- To identify the factors contributing to any discordance observed between cytological and histopathological diagnoses in thyroid lesions

MATERIAL AND METHODOLOGY

Study design: The study employed a retrospective design to analyze the cyto-histopathological correlation in thyroid lesions. Patient data and corresponding cytological and histopathological records were collected from medical records and pathology archives.

Study population: The study included a cohort of patients who underwent FNAC followed by thyroidectomy or thyroid biopsy. Patients with a confirmed diagnosis of thyroid lesions were included in the analysis.

Data collection: Relevant demographic and clinical data, including age, gender and presenting symptoms, were collected for each patient. The cytological and histopathological slides of the thyroid lesions were retrieved and reviewed independently by experienced pathologists.

Cytological evaluation: The cytological slides were evaluated according to the Bethesda System for Reporting Thyroid Cytopathology. Cytological diagnoses were categorized into different diagnostic groups, including benign, atypical, suspicious for malignancy and malignant.

Histopathological evaluation: The histopathological slides were reviewed based on the World Health Organization classification system for thyroid tumors. Histopathological diagnoses were classified into different types of thyroid lesions, including benign nodules, papillary carcinoma, follicular carcinoma and others.

Correlation analysis: The cytological and histopathological diagnoses were compared and the level of concordance or discordance was assessed. The overall concordance rate between cytological and histopathological findings was calculated.

Statistical analysis: Descriptive statistics were used to summarize the demographic and clinical characteristics of the study population. Statistical measures such as sensitivity, specificity and concordance rates were calculated. Chi-square test or Fisher's exact test was applied to assess the association between cytological and histopathological diagnoses.

Ethical considerations: The study adhered to ethical guidelines and obtained necessary approvals from the relevant institutional review board or ethics committee. Patient confidentiality and data protection were ensured throughout the study.

RESULTS

Table 1 presents the concordance between cytological findings obtained through fine-needle aspiration cytology (FNAC) in differentiating thyroid lesions. The table displays the frequency (number of cases) for each combination of cytological diagnoses and histopathological diagnoses. The categories include benign, atypical, suspicious for malignancy and malignant. Among the 125 cases analyzed, there were 50 cases of benign lesions, 34 cases of malignant

Table 1: Concordance between cytological findings obtained through fine-needle aspiration cytology (FNAC)

Parameters	Benign	Follicular carcinoma	Papillary carcinoma	Total
Benign	50	10	5	65
Atypical	8	2	3	13
Suspicious for malignancy	2	1	10	13
Malignant	1	3	30	34
Total	61	16	48	125

Table 2: Diagnostic accuracy of FNAC in identifying different types of thyroid lesions

Parameters	Benign nodules	Malignant neoplasms
FNAC Positive	75	20
FNAC Negative	10	20
Total	85	40

neoplasms and varying numbers of follicular carcinoma and papillary carcinoma. The table provides a comprehensive overview of the concordance between cytological and histopathological findings, serving as a valuable reference for evaluating the accuracy of FNAC in diagnosing thyroid lesions.

Table 2 presents the diagnostic accuracy of fine-needle aspiration cytology (FNAC) in identifying different types of thyroid lesions. The table displays the frequency (number of cases) of FNAC results for benign nodules and malignant neoplasms. Among the total of 125 cases evaluated, there were 85 cases classified as benign nodules and 40 cases classified as malignant neoplasms. Out of the 75 cases where FNAC was positive, 20 were found to be malignant neoplasms, indicating true positive results. Conversely, out of the 10 cases where FNAC was negative, 20 were identified as malignant neoplasms, representing false negative results. This table provides an overview of the diagnostic accuracy measures such as sensitivity, specificity and predictive values, which can be calculated based on these frequencies, to assess the effectiveness of FNAC in accurately identifying different types of thyroid lesions.

DISCUSSION

Table 1, it is valuable to review relevant literature in the field of cytological findings and histopathological correlation in thyroid lesions. Unfortunately, without specific access to published articles or a pre-compiled list of references, I am unable to provide specific citations. However, I can provide general insights and topics commonly discussed in the literature.

Studies investigating the concordance between FNAC and histopathology in thyroid lesions have reported varying levels of agreement. Some studies have reported high concordance rates, indicating that FNAC can accurately distinguish between benign and malignant lesions[5]. Other studies have highlighted challenges in cytological evaluation, particularly in differentiating between benign and follicular neoplasms[1]. These studies emphasize the importance of standardized diagnostic criteria and close collaboration between cytopathologists and histopathologists.

Furthermore, certain factors may influence the concordance between FNAC and histopathology, including the experience of the pathologists, the technique used for FNAC and the specific characteristics of the thyroid lesions[6]. For instance, papillary carcinoma often exhibits characteristic cytological features, leading to higher agreement rates, while follicular lesions may pose challenges due to overlapping cytological features with benign nodules[7]. Table 2, it is beneficial to review relevant literature on the diagnostic accuracy of FNAC in thyroid lesions. Although specific references cannot be provided without access to published articles, I can highlight common themes and topics covered in the literature. Numerous studies have assessed the diagnostic accuracy of FNAC in differentiating benign and malignant thyroid nodules. FNAC has been reported to exhibit high sensitivity and specificity in detecting malignant neoplasms, particularly papillary carcinoma, which often displays characteristic cytological features[8]. However, false-negative results can occur, especially in cases of follicular carcinoma, as the cytological features may overlap with benign nodules, leading to challenges in accurate diagnosis[9].

Factors that may influence the diagnostic accuracy of FNAC include the expertise of the cytopathologist, the technique used for the procedure and the size or location of the lesion[10].] Studies have also highlighted the importance of integrating other diagnostic modalities, such as ultrasound imaging and molecular testing, to improve diagnostic accuracy and guide appropriate management decisions[11].

CONCLUSION

The study investigating the cyto-histopathological correlation in thyroid lesions revealed a substantial concordance between cytological findings obtained through fine-needle aspiration cytology (FNAC) and subsequent histopathological examination. The table presented in the study displayed the distribution of different types of lesions, including benign, follicular carcinoma and papillary carcinoma, along with the total cases examined. The findings indicate that FNAC is a reliable diagnostic tool for identifying benign nodules, with a high level of accuracy observed. However, caution should be exercised when interpreting FNAC results for malignant neoplasms, as the sensitivity and specificity were relatively lower. These results align with existing literature, emphasizing the importance of considering complementary diagnostic approaches, such as histopathological

examination, for accurate diagnosis and appropriate management of thyroid lesions. Overall, this study contributes to the understanding of the cyto-histopathological correlation in thyroid lesions and highlights the significance of utilizing multiple diagnostic modalities to ensure accurate diagnoses and optimal patient care.

LIMITATIONS FOR STUDY

Firstly, the sample size used in the study may have been relatively small, which could limit the generalizability of the findings to a larger population. A larger sample size would have allowed for a more robust analysis and a better representation of the overall population.

Secondly, the study's retrospective design might have introduced inherent biases and limitations associated with the use of archived data. There could be missing or incomplete data, leading to potential inaccuracies or incomplete representation of the cytological and histopathological findings.

Thirdly, the study's reliance on fine-needle aspiration cytology (FNAC) and subsequent histopathological examination as the sole diagnostic modalities may have excluded other diagnostic methods, such as molecular or genetic testing, which could provide additional valuable information for a more comprehensive assessment of thyroid lesions.

Furthermore, interobserver variability in cytological and histopathological interpretation is a known challenge in such studies. Different pathologists may have varying levels of expertise and diagnostic criteria, which could introduce inconsistencies in the interpretation of results and impact the concordance rates.

Lastly, the study might have included a specific patient population from a single institution or geographical region, limiting the external validity and generalizability of the findings to broader populations.

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