Chapter 29 / Capítulo 29

Screening, Diagnosis, and Prevention in Clinical Practice: Evidence from Argentine and Latin American Medicine (English Version)
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Most frequent diagnosis in biopsy samples from patients with thyroid nodules examined at the Clinical Surgical Pathology Laboratory in the city of Rosario between 2022 and 2024

Diagnóstico más frecuente en muestras de biopsias de pacientes con nódulos tiroideos examinadas en el Laboratorio de Patología Clínico Quirúrgica de la ciudad de Rosario entre los años 2022-2024

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ABSTRACT

Introduction: thyroid nodule biopsy is a crucial procedure for determining the nature of these growths in the thyroid gland.
Objective: to identify the most frequent anatomical-pathological diagnosis in biopsy samples from patients with thyroid nodules examined at the Clinical Surgical Pathology Laboratory in the city of Rosario between 2022 and 2024.
Method: this was a quantitative, observational study with a descriptive, cross-sectional, retrospective design. The research was carried out at the Clinical Surgical Pathology Laboratory in Rosario. The population consisted of all patients who had their biopsy samples taken between 2022 and 2024. Data collection was carried out by reviewing medical records. The variables were analysed using absolute and relative frequencies.
Results: Fifty-seven medical records of patients with biopsy samples were analysed. The mean age of the patients was 52,79 ± 14,57 years (min. 18; max. 86); of these, 82 % were female and 18 % were male. The 36-50 age group was the most frequent. Ninety-eight per cent had thyroid nodules. The most frequent anatomopathological diagnoses in the biopsy samples were papillary carcinoma (39 %), thyroid hyperplasia (23 %), follicular adenoma (21 %), and Hashimoto's thyroiditis (11 %). Forty-nine per cent of the biopsy samples were benign, 12 % were follicular lesions of uncertain significance, and 39 % were malignant.
Conclusions: of 57 thyroid biopsy samples, a higher frequency of female patients between the ages of 36 and 50 was observed. The anatomopathological diagnoses found were papillary carcinoma, hyperplasia, follicular adenoma, and thyroiditis. The frequency of diagnoses corresponding to malignant neoplasms in relation to benign processes according to the Bethesda system was 49 % benign vs. 39 % malignant.

Keywords: Thyroid Nodules; Biopsies; Diagnosis; Malignancy; Benignity.

RESUMEN

Introducción: la biopsia de nódulos tiroideos es un procedimiento crucial para determinar la naturaleza de estos crecimientos en la glándula tiroides.

Objetivo: identificar el diagnóstico anatomo-patológico más frecuente en las muestras de biopsias de pacientes con nódulos tiroideos examinadas en el Laboratorio de Patología Clínico Quirúrgica de la ciudad de Rosario durante los años 2022 a 2024.
Método: el estudio fue de tipo cuantitativo, observacional, con un diseño descriptivo de corte transversal y retrospectivo. La investigación fue realizada en el servicio del Laboratorio de Patología Clínico-Quirúrgica de Rosario. La población estuvo constituida por la totalidad de pacientes que tuvieron sus muestras de biopsias entre los años 2022 y 2024. La recolección de datos se realizó mediante revisión de historias clínicas. Las variables se analizaron a través de frecuencias absolutas y relativas porcentuales.
Resultados: se analizaron 57 historias clínicas de pacientes con que tuvieron muestras de biopsias. La edad media de los pacientes fue de 52,79 ± 14,57 años (Min. 18; Max. 86); de estos el 82 % eran del sexo femenino y 18 % masculinos. Con una mayor frecuencia del grupo etario de 36 a 50 años. El 98 % presentó nódulos tiroideos. Los diagnósticos anatomo-patológicos más frecuente en las muestras de biopsias fueron carcinoma papilar (39 %), hiperplasia tiroidea (23 %), adenoma folicular (21 %) y tiroiditis de Hashimoto (11 %). El 49 % de las muestras de biopsias eran benignas, 12 % eran lesiones foliculares de significado incierto y 39 % eran malignas.
Conclusiones: de 57 muestras de biopsias de tiroides, se observó una mayor frecuencia de pacientes femeninas con edad entre los 36 y 50 años. Los diagnósticos anatomo- patológicos hallados fueron carcinoma papilar, hiperplasia, adenoma folicular y tiroiditis. La frecuencia de diagnósticos correspondientes a neoplasias malignas en relación con los procesos benignos según el sistema Bethesda fue de 49 % benignas vs 39 % malignas.

Palabras clave: Nódulos Tiroideos; Biopsias; Diagnostico; Malignidad; Benignidad.

INTRODUCTION

A thyroid nodule is an abnormal growth in the thyroid gland, located at the front of the neck, above the collarbones. Nodules can be solid, cystic, or mixed, and can be single or multiple (Mayo Foundation for Medical Education and Research, 2022). The discovery of a thyroid nodule is a common clinical situation, with increasing frequency due to the widespread use of radiological tests and greater awareness among healthcare professionals. The main objective of evaluating thyroid nodular disease is to differentiate benign from malignant nodules. To achieve this differentiation, three essential components are generally required: an endocrinological evaluation, a thyroid ultrasound, and a thyroid cytology (Fernández-García et al., 2014).

In most cases, the condition is non-malignant; however, in certain patients, it is important to rule out an underlying neoplasm based on clinical and ultrasound characteristics. These nodules are usually asymptomatic, but advances in ultrasound techniques have increased their diagnosis and incidence. Therefore, it is essential to perform a thorough examination of all patients with thyroid nodules to avoid unnecessary invasive procedures and identify those at higher risk of developing disease (Román-González et al., 2012).

The prevalence of palpable thyroid nodules in the general population is 4 %-7 %. Most thyroid nodules are benign and asymptomatic, but it is important to evaluate them to rule out cancer, which is estimated to affect 5 % to 10 % of nodules. Factors that may increase the risk of developing thyroid nodules include age, female sex, childhood radiation exposure, family history of thyroid nodules, and living in areas with iodine deficiency (Estrada & Guerrero, 2020; Tala et al., 2017).

Total thyroidectomy is the preferred treatment for various types of thyroid cancer. Fine-needle aspiration biopsy (FNAB) is crucial for evaluating patients with thyroid nodules. This method is quick, minimally invasive, and inexpensive, reducing unnecessary surgeries in benign cases and properly classifying malignant cases for timely surgical intervention (Rodríguez González et al., 2017).

According to the American Cancer Society (2024), it is estimated that approximately 44,020 new cases of thyroid cancer will be diagnosed this year, of which 12,500 will be men and 31,520 women, with an approximate mortality rate of 2,170 people from this disease. However, since 2009, the mortality rate for thyroid cancer has remained virtually constant (American Cancer Society, 2024).

According to estimates by the Global Cancer Observatory (Globocan), under the supervision of the International Agency for Research on Cancer (IARC), and based on population-based cancer registries in Argentina, 4,106 cases of thyroid cancer were reported. Of these cases, 669 were in males, while 3,437 were in females (Ministry of Health of the Nation, 2021).

Similarly, a study conducted at the Oroño Medical Diagnostic Center in the city of Rosario in 2022 described 14 patients who underwent surgery for thyroid carcinoma, 79 % of whom were female, with a mean age of 48 years (Truffa, 2023).

Therefore, the anatomopathological diagnosis of thyroid nodules is essential to distinguish benign from malignant cases and thus avoid unnecessary thyroidectomies. Considering that the anatomopathological diagnosis not only determines the nature of the nodule but also influences the treatment and follow-up of the patient. An accurate diagnosis can prevent unnecessary surgical interventions in benign cases, which is a key aspect of modern medicine. In addition, it allows an appropriate follow-up plan to be established for patients with benign or indeterminate nodules.

Given that this is a preventable condition through early detection methods and with a higher prevalence in women, the following research question arises: What are the most frequent anatomopathological diagnoses in biopsy samples from patients with thyroid nodules examined at the Clinical Surgical Pathology Laboratory in the city of Rosario between 2022 and 2024?

General Objective

- To describe the anatomopathological diagnoses in biopsy samples from patients with thyroid nodules examined at the Clinical Surgical Pathology Laboratory in the city of Rosario between 2022 and 2024.

METHOD

Design

The study was quantitative, observational, with a descriptive cross-sectional and retrospective design. The research was carried out between August and November 2024.

Scope

The research was conducted at the Clinical Surgical Pathology Laboratory in Rosario, located at 1885 Calle 3 de Febrero in the province of Santa Fe, city of Rosario, Argentina, which is a private institution providing histopathological diagnosis services for deferred or intraoperative cases, as well as highly complex immunohistochemical techniques. It receives material referred by

various medical, clinical, and surgical specialties from hospitals across the city, with an annual volume of 6,000 samples.

Population and sample selection
The population consisted of all patients whose biopsy samples were sent to the pathology department of the Rosario Clinical Surgical Laboratory between 2022 and 2024.

Inclusion criteria
- Patients over 18 years of age with thyroid nodules
- Surgical biopsy samples from 2022 to 2024 were sent to the Rosario Clinical Surgical Pathology Laboratory
- Samples satisfactory for study, of sufficient volume for diagnosis, and well preserved.

Exclusion criteria
- Patients with a personal history of thyroid cancer.
- Patients with a history of previous neck irradiation.

Sampling and sample size
Consecutive non-probabilistic sampling was performed. The sample consisted of biopsy results recorded in the Clinical Surgical Pathology Laboratory system that met the inclusion criteria.

Instruments
The data collection technique used was a systematic review of patient medical records containing thyroid biopsy reports.
For data collection, a record sheet in Excel was used, specifically designed to capture relevant information from thyroid biopsy reports available in the pathology section of the Laboratory. This sheet included structured fields to capture variables such as nodule type, histological characteristics, final diagnosis, patient demographics, and other data relevant to the study. The form was used by researchers to extract and systematize information directly from pathology reports, ensuring accurate and consistent data collection.

Definitions
- Thyroid nodule: A focal lesion in the thyroid gland, detected clinically or through imaging, which can be evaluated by biopsy to determine its nature (benign or malignant).
- Anatomopathological diagnoses: performed by thyroid biopsy, which consists of removing a sample of tissue from the thyroid gland and examining it under a microscope. The final diagnosis will be established by microscopic examination of tissue obtained by biopsy. This diagnosis will be based on the identification of specific histological characteristics that allow classification of the thyroid nodule (benign, malignant, or indeterminate) and determination of the presence of any associated thyroid pathology.
- Bethesda System: This is a pathological risk system that will determine the malignancy or benignity of a thyroid nodule. This system will classify thyroid lesions into the following categories:
  - Category I—Non-diagnostic/unsatisfactory
  - Category II- Benign
  - Category III—Atypia or follicular lesion of uncertain significance
  - Category IV- Possible Neoplasia or Follicular Neoplasia
  - Category V Lesion suspicious for malignancy
  - Category VI Malignant

Variables

- Age: Discrete quantitative variable. Operationalization: In full years
- Sex: Dichotomous nominal qualitative variable. Operationalization: Female/Male
- Thyroid nodule: Dichotomous nominal qualitative variable. Operationalization: Yes/No
- Anatomopathological diagnoses. Polytomous nominal qualitative variable

Statistical analysis

The data were entered into an Excel spreadsheet and processed using SPSS statistical software. Quantitative variables were analyzed using measures of central tendency (mean, median, and mode), non-central measures (quartiles 1 and 3), and measures of dispersion (range and standard deviation). Qualitative variables were analyzed using absolute frequencies and relative percentages. Based on these summaries, graphs were constructed using Excel, and tables were created for easy visualization.

Ethical considerations

The ethical and legal implications implemented in the research were aimed at maintaining patient anonymity and confidentiality. These measures were based on the Declaration of Helsinki and the Personal Data Protection Act (Law 25,326).

In addition, permission was requested from the Director of the Clinical Surgical Pathology Laboratory at Rosario to access the institution's database to collect the data necessary to carry out the scientific work. The Medical School Administration approved the study.

RESULTS

Fifty-seven medical records of patients with biopsy samples were analyzed. The mean age of the patients was 52,79 ± 14,57 years (Min. 18; Max. 86); 82 % were female, and 18 % were male. The age group 36 to 50 years was the most frequent (figura 1).

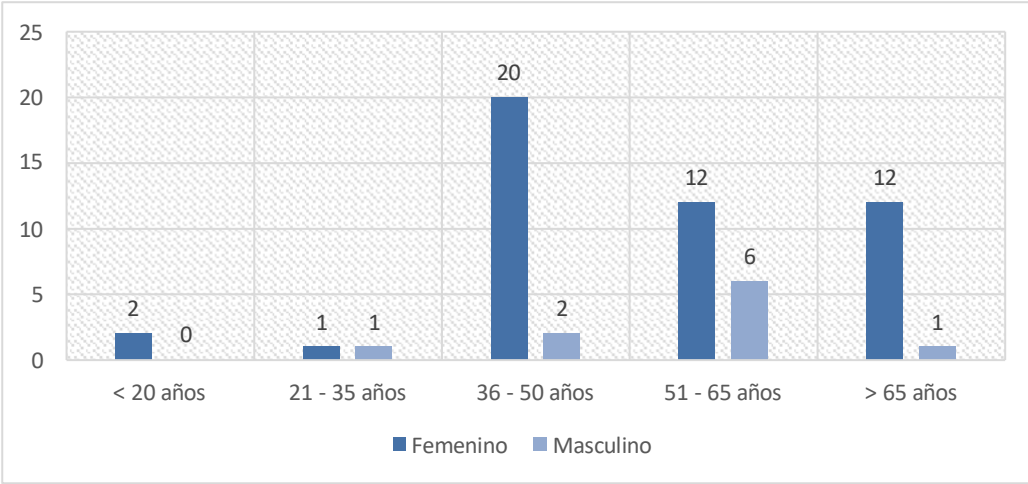

Figure 1. Distribution of patients with thyroid nodules with an anatomopathological diagnosis according to age and sex

The most frequent anatomopathological diagnoses in the biopsy samples were papillary

carcinoma (39 %), thyroid hyperplasia (23 %), follicular adenoma (21 %), and Hashimoto's thyroiditis (11 %) (figure 2).

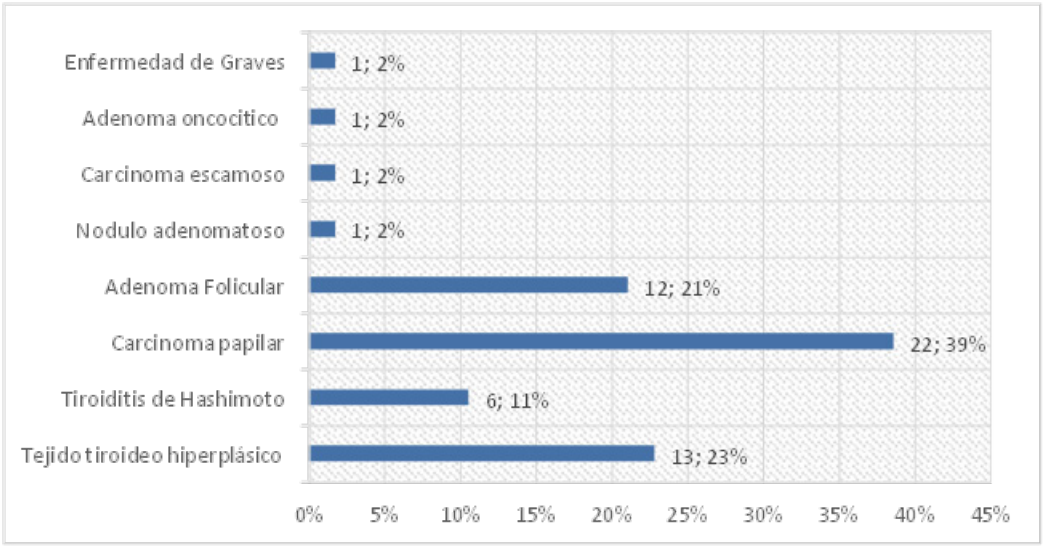

Figure 2. Anatomopathological diagnoses

Figure 3 shows the frequency of diagnoses corresponding to malignant neoplasms in relation to benign processes according to the Bethesda system.

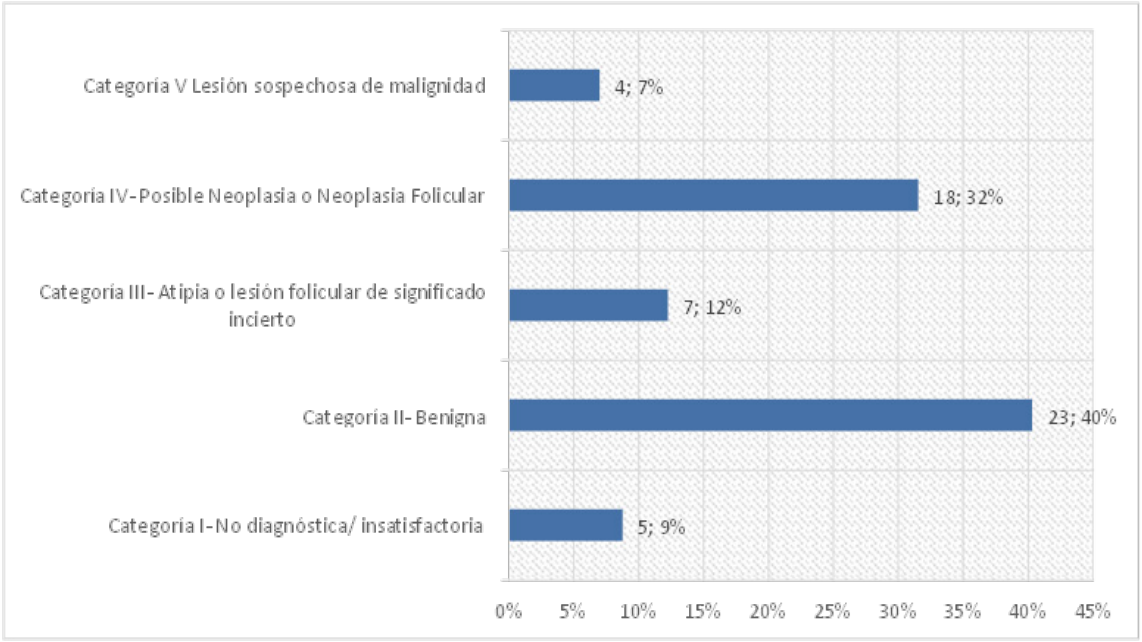

Figure 3. Classification according to the Bethesda system

According to the Bethesda system, the following was observed:

- 49 % of biopsy samples were benign
- 12 % of biopsy samples were follicular lesions of uncertain significance
- 39 % of biopsy samples were malignant

DISCUSSION

The most frequent anatomopathological diagnosis in biopsy samples from patients with thyroid nodules was mostly found in people aged 32 to 50 years, 82 % of whom were female. It was found that 98 % of these patients had thyroid nodules.

This result is similar to that of Klaus-Fischer et al. (2020), whose study included mainly women (81 %). Most patients underwent complete removal of the thyroid gland (total thyroidectomy). Despite this, nodules were identified in the opposite lobe in more than half of the cases. In some patients, a second surgery was necessary to complete the removal.

In this study, of the 128 nodules with a definitive histopathological diagnosis, 49,2 % were benign lesions and 50,7 % were malignant neoplasms. A significant correlation was observed between the Bethesda category and malignancy, with nodules classified as Bethesda V and VI presenting the highest risk of malignancy (79 % and 100 %, respectively). In contrast, Bethesda II nodules showed the lowest malignancy rate (14 %) (Klaus-Fischer et al., 2020).

Truffa (2023) conducted research in Argentina, where he found a cohort of 14 patients with differentiated thyroid carcinoma and initial negative morphological studies, with a predominance of females and a mean age of 48,14 years. The most frequent histology was papillary carcinoma, and the most common site of recurrence was the cervical lymph nodes. The median time to recurrence was 19 months, and patients had elevated thyroglobulin and maximum SUV values on PET/CT images.

According to Maxwell and Sipos (2019), the prevalence of thyroid nodules depends on the detection method. Palpation identifies nodules in approximately 5 % to 10 % of patients. However, the use of a sensitive imaging modality such as ultrasound (US) reveals nodular thyroid disease in up to 34,2 % of patients. Nodularity within the thyroid increases linearly with age. Thyroid nodules are observed in 12,9 % of those under 30, while 50 % to 70 % of those over 70 have one or more nodules.

In the United States, according to Mayson and Haugen (2019) at the University of Colorado Hospital, many factors influence the decision to recommend molecular diagnostic testing for patients with indeterminate thyroid nodules. The most common indication for molecular testing in this clinical practice is to help guide the selection of patients with Bethesda III/IV cytology results who can be treated with clinical follow-up rather than immediate diagnostic thyroid surgery.

According to Pinto and Ursúa (2019), fine-needle aspiration biopsy (FNAB) has been established as the method of choice for the initial evaluation and management of thyroid nodules. The Bethesda System, in its second edition, provides a standardized framework for the cytological classification of FNA samples, enabling more accurate communication between pathologists and clinicians. Assignment to a specific Bethesda category has direct implications for therapeutic decision-making, as each category carries an inherent risk of malignancy.

In Cuba, Escalona (2023) conducted research to describe the use of the Bethesda system for diagnosing thyroid nodules and assessing malignancy, finding that most participants were between 41 and 50 years old, with an average age of almost 50. Most Pap smear results were classified as Bethesda category II. Of the most severe cases (category III), more than half required surgery, and almost a third of those cases resulted in cancer.

Román et al. (2013) also explain that the prevalence of malignancy in thyroid nodules is relatively low, ranging from 4 % to 8 %. The evaluation of thyroid nodules is based mainly on ultrasound and FNA. The criteria for FNAB include nodule size, ultrasound characteristics, and risk factors such as age, sex, and smoking status. Tumor marker testing is not recommended in routine clinical practice. Thanks to these diagnostic tools, it has been possible to reduce the number of unnecessary thyroidectomies significantly.

In any case, the initial evaluation of a patient with a thyroid nodule should include a thorough medical history and physical examination. It is particularly important to look for risk factors such as exposure to ionizing radiation, family history of thyroid cancer, or multiple endocrine neoplasia syndromes. Likewise, the presence of compressive symptoms such as dysphonia, dysphagia, or dyspnea may point to a malignant process (Román et al., 2013).

According to Truffa (2023), recurrence of differentiated thyroid carcinoma is most frequently observed in women over the age of 40, predominantly in the cervical lymph nodes. Patients with recurrence have a disease-free interval of less than two years and an average tumor size of 5-10 mm.

LIMITATIONS

The fact that this is a retrospective study using secondary sources for data collection makes underreporting possible.

Furthermore, as this is a single-center study, these conditions suggest that the results may not be extrapolated to all patients with thyroid nodule biopsy samples who attended the various health centers in the city of Rosario during 2022-2024.

CONCLUSIONS

Of 57 thyroid biopsy samples, a higher frequency of female patients aged 36-50 was observed. The anatomopathological diagnoses found were papillary carcinoma, hyperplasia, follicular adenoma, and thyroiditis. The frequency of diagnoses corresponding to malignant neoplasms vs. benign processes according to the Bethesda system was 49 % benign vs. 39 % malignant.

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