

Hurthle Cell Neoplasm in Thyroid Nodular Swellings: Retrospective Analysis from a Surgical Department in Derna, Libya

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Abstract:

Hurthle cell neoplasms in the thyroid gland present diagnostic complexities due to varied histology, requiring comprehensive assessment for accurate diagnosis and management. This retrospective study at Derna Hospital, Libya, from 2010 to 2017, involving 225 patients with thyroid nodules, aimed to explore demographic profiles, clinical manifestations, and diagnostic accuracy. Patients underwent thorough evaluations including thyroid function tests, ultrasounds, and fine-needle aspiration cytology, followed by histopathological examination post-surgery. Findings revealed a predominance of normal thyroid function and multinodular goiter in females aged 31-40, with benign Hurthle cell adenomas being common and malignancies rare. Discrepancies between cytodiagnosis and histodiagnosis, notably in inflammatory lesions and papillary carcinoma detection, were observed, guiding tailored surgical interventions such as hemithyroidectomy and total thyroidectomy. While limitations include retrospective design and potential biases, this study underscores the necessity for refined research to enhance diagnostic accuracy and treatment outcomes in thyroid disorders, emphasizing the significance of a comprehensive approach in patient care.

Keywords: Thyroid Nodules, Hurthle Cell Neoplasm, Diagnostic Assessment, Cytodiagnosis, Histodiagnosis.

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ورم الخلية الحولية في انتفاخات العقد الدرقيّة: تحليل استرجاعي من إحدى الأقسام الجراحية في درنة، ليبيا

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الملخص

تعاني الأورام الحولية في الغدة الدرقيّة من تعقيدات تشخيصية ناتجة عن تنوع التاريخ النسيجي، مما يتطلب تقييماً شاملاً لتحقيق التشخيص والإدارة الدقيقة. هذه الدراسة الاسترجاعية في مستشفى درنة بليبيا، من عام 2010 إلى 2017، والتي شملت 225 مريضاً يعانون من عقد

الدرقية، هدفت إلى استكشاف الملامح الديموغرافية والمظاهر السريرية والدقة التشخيصية. خضع المرضى لتقييمات شاملة تشمل اختبارات وظائف الدرقية والأشعة فوق الصوتية وسائتولوجيا الرشاشة الرفيعة، تلتها الفحوص النسيجية البعدية بعد الجراحة. كشفت النتائج عن سيطرة وظائف الدرقية الطبيعية ووجود تضخم متعدد العقد عند الإناث في الفئة العمرية 31-40 عاماً، مع انتشار شائع للورم الحولي الحميد وندرة الأورام الخبيثة. لوحظ وجود تناقضات بين التشخيص الخلوي والنسجي، خاصة في الأورام الالتهابية واكتشاف سرطان الخلايا النقيية، مما أدى إلى توجيه تدخلات جراحية مخصصة مثل جراحة نصف الغدة الدرقية واستئصال الغدة الدرقية بالكامل. بينما تتضمن القيود التصميم الاسترجاعي والتحيزات المحتملة، تؤكد هذه الدراسة على ضرورة تنقيح البحث لتعزيز الدقة التشخيصية ونتائج العلاج في اضطرابات الدرقية، مشددة على أهمية النهج الشامل في رعاية المرضى.

الكلمات المفتاحية: عقد الدرقية، ورم الخلية الحولية، التقييم التشخيصي، سائتولوجيا الرشاشة الرفيعة، الفحوص النسيجية.

Introduction

The Hurthle cell neoplasms of the thyroid gland are a distinct subset of thyroid tumors characterized by the presence of Hurthle cells, which are derived from follicular cells and exhibit unique histological features [1-3]. These neoplasms include both benign and malignant forms, with Hurthle cell adenomas being benign and Hurthle cell carcinomas representing the malignant counterpart [4,5]. The differentiation between benign and malignant Hurthle cell tumors is challenging due to the lack of specific histological markers, necessitating reliance on features such as capsular or vascular invasion or metastases for diagnosis [6]. Interestingly, despite the difficulty in distinguishing between benign and malignant forms, Hurthle cell neoplasms share certain immunohistochemical characteristics, such as the expression of thyroglobulin, carcinoembryonic antigen (CEA), and p21 ras oncogene product [7]. However, these markers are not definitive for malignancy, as they are also present in benign tumors. Additionally, the origin of Hurthle cell neoplasms is attributed to follicular cells, supported by the presence of an intact thyroid-stimulating hormone (TSH) receptor-adenylate cyclase system in benign tumors, which is typically absent in malignant forms [8,9]. In summary, Hurthle cell neoplasms of the thyroid gland are a unique group of tumors with oncocytic features that pose diagnostic challenges due to the overlap of histological characteristics between benign and malignant forms. The presence of Hurthle cells, which are nonfunctional and typically appear as cold nodules on radionuclide scans, is a defining feature of these neoplasms [10]. Treatment approaches and prognostic outcomes vary depending on the nature of the tumor, with total thyroidectomy and node dissection being recommended for potentially malignant cases [11]. Despite advances in immunohistochemical analysis, the distinction between benign and malignant Hurthle cell tumors still relies heavily on traditional histologic features [9,10].

Our study aims to comprehensively explore the evaluation and management of thyroid swelling by employing a multidisciplinary approach. It seeks to elucidate the demographic profiles, clinical manifestations, and diagnostic findings of patients presenting with thyroid nodules. Additionally, the study aims to delineate the prevalence of Hurthle cell neoplasm within the study cohort. Through an analysis of the correlation between cytodiagnosis and histodiagnosis, the study endeavours to assess the diagnostic accuracy of different pathological entities. Furthermore, the study evaluates the surgical interventions undertaken based on the characteristics of thyroid nodules to optimize patient care and outcomes.

Material and methods

Patient Recruitment and Diagnostic Evaluation:

This study, conducted retrospectively at Derna Hospital in Libya from 2010 to 2017, focused on patients diagnosed clinically with thyroid nodules and subsequently admitted to the surgery department. The study included a total of 225 patients meeting these criteria. To ensure diagnostic consistency and accuracy, all patients underwent thyroid function tests to evaluate thyroid hormone levels as part of their initial assessment. Additionally, patients underwent preoperative ear, nose, and throat (ENT) examinations, thyroid ultrasound scan (USG), and fine-needle aspiration cytology (FNAC) of thyroid nodules for further diagnostic evaluation. Postoperative histopathological examination was performed for all patients who underwent thyroid surgery.

Ethical Approval:

Ethical considerations were of paramount importance throughout the study. The research protocol received approval from the ethics committee of Derna Hospital, ensuring compliance with ethical standards and guidelines for human research. Informed consent was obtained from all participants or their legal guardians before any procedures were initiated. Moreover, strict confidentiality measures were implemented to safeguard the privacy of patients' personal and medical information. Patient data were anonymized and securely stored in accordance with data protection regulations.

Statistical Analysis:

All data were meticulously organized using Microsoft Excel, while statistical analyses were conducted using SPSS Statistics (IBM) for thorough testing and interpretation.

Results

Multidisciplinary evaluation of thyroid swelling: Insights from 225 surgical cases

A total of 225 patients were admitted to the surgical department due to thyroid swelling. Upon admission, patients underwent a comprehensive clinical assessment, including ultrasound scans of the thyroid, thyroid function tests, fine-needle aspiration cytology (FNAC), and examination by an ear, nose, and throat (ENT) specialist. Among the admitted patients, 175 were found to have normal thyroid function, while 33 presented with hyperthyroidism and 17 with hypothyroidism. We noted that the majority of our cases were euthyroid, with normal TSH levels.

Thyroid ultrasonography revealed multinodular goiter in 148 cases, solid nodules in 39 cases, cystic nodules in 20 cases, and diffuse enlargements in 28 cases. During clinical evaluation, it was observed that among the cases presenting with multinodular goiter (MNG) based on ultrasound findings, there was a dominant nodule evident. Specifically, solitary nodules were identified in the right lobe in 85 patients, in the left lobe in 63 patients, and the isthmus in 23 cases. Additionally, 45 patients clinically diagnosed with multinodular goiter presented with dominant nodules. Notably, among the cases clinically diagnosed with multinodular goiter, 10 presented with dominant nodules as identified through ultrasound imaging.

Age distribution and thyroid lesion classification among the study cohort

Among the 225 patients presenting with thyroid swellings, ranging in age from 22 to 65 years, over 80% were females (82% females, 18% males). The 31-40 age group appears to have the highest frequency of cases across all lesion classifications. Across all age groups, non-inflammatory thyroid lesions were more predominant compared to inflammatory lesions. The highest number of non-inflammatory cases was observed in the 31-40 and 41-50 age groups, with 55 and 49 cases respectively. The occurrence of inflammatory lesions decreases in older age groups (Figure 1).

Benign thyroid lesions were more common across all age groups compared to malignant lesions. The 31-40 age group has the highest number of benign lesions with 20 cases, followed closely by the 41-50 and 51-60 age group with 10 cases each. The highest observed benign tumor in this dataset was Hurthle cell adenoma. Malignant thyroid lesions were relatively rare in this dataset, with the highest number (3 cases) observed in the 31-40 age group. As age increases beyond 50 years, there is a general decrease in the number of cases diagnosed, particularly in the 51-60 and 61-70 age groups.

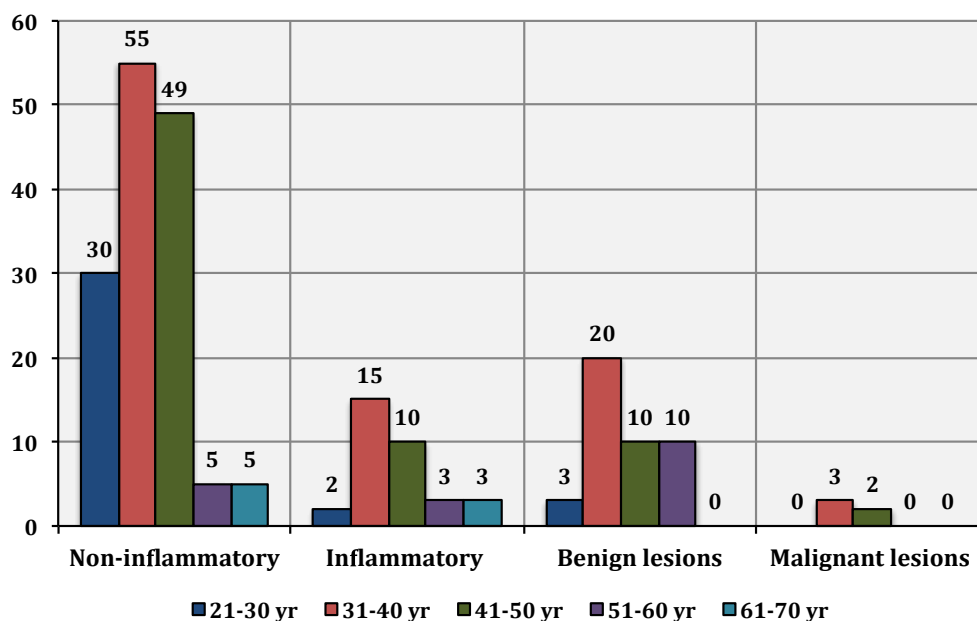


Figure 1: Influence of age on the prevalence and type of lesions observed in the study population (n=225).

Correlation between cytodiagnosis and histodiagnosis of thyroid gland lesions^[1]

Table 1 presents the correlation between cytodiagnosis and histodiagnosis of operated thyroid cases, categorized into non-neoplastic and neoplastic lesions.

In non-neoplastic lesions, the correlation between cytodiagnosis and histodiagnosis appears to be generally high. For instance, in cases of colloid and nodular goiter, out of 137 cases diagnosed cytologically, 139 cases were confirmed histologically, resulting in a correlation of 98.5%. Similarly, for diffuse goiter, all cases diagnosed cytologically (5 cases) were confirmed histologically, resulting in a perfect correlation of 100%. However, in cases of inflammatory lesions such as Hashimoto thyroiditis, lymphocytic thyroiditis, and granulomatous thyroiditis, cytodiagnosis did not yield any positive cases, while histodiagnosis identified cases, indicating a lack of correlation in these instances.

In neoplastic lesions, the correlation between cytodiagnosis and histodiagnosis appears slightly lower compared to non-neoplastic lesions but still considerable. For instance, in cases of follicular neoplasm, out of 5 cases diagnosed cytologically, 7 cases were confirmed histologically, resulting in a correlation of 88%. Similarly, for Hurthle cell adenoma, although the correlation is slightly lower at 80%, there is still a significant concordance between cytodiagnosis and histodiagnosis. However, there were instances where cytodiagnosis did not detect cases that were identified histologically, particularly in papillary carcinoma, where no cases were identified cytologically despite 3 cases being confirmed histologically.

Table 1: Correlation between histodiagnosis and cytodiagnosis of thyroid lesions.

		Diagnosis	No of cases of cytodiagnosis	No of cases of histodiagnosis	Correlation
Non-neoplastic lesions	Non-inflammatory (hyperplasia)	Colloid and nodular goiter	137	139	98.5
		Diffuse goiter	5	5	100
	Inflammatory	Hashimoto thyroiditis	0	17	0
		Lymphocytic thyroiditis	0	15	0
		Granulomatous thyroiditis	0	2	0
Neoplastic lesions	Follicular neoplasm	5	7	88	
	Hurthle cell adenoma	30	37	80	
	Papillary carcinoma	0	3	0	
Total			177	225	

Surgical interventions based on thyroid nodule characteristics

Hemithyroidectomy, either right or left, was performed for patients experiencing compression symptoms due to solitary nodules in either the right or left lobes, totaling 153 cases. Additionally, isthmusectomy was performed for 22 patients. In cases where FNAC results indicated Hurthle cell adenoma, totaling 37 patients, regardless of whether they presented with solitary or dominant nodules on the background of MNG, total thyroidectomy was conducted. Furthermore, total thyroidectomy was performed for three cases diagnosed with papillary carcinoma.

Discussion:

The findings of this study shed light on the comprehensive evaluation and management of thyroid swelling, drawing insights from a cohort of 225 surgical cases. Through a multidisciplinary approach, including clinical assessment, diagnostic imaging, and histopathological examination, a thorough understanding of thyroid pathologies was achieved.

Clinical Evaluation and Demographics:

The majority of patients admitted with thyroid swelling demonstrated normal thyroid function, indicating a predominance of euthyroid cases. Thyroid ultrasonography revealed various morphological abnormalities, with multinodular goiter being the most common finding. Interestingly, female predominance was observed among the study cohort, aligning with the higher prevalence of

thyroid disorders among women. Age distribution analysis highlighted the peak occurrence of thyroid swellings in the 31-40 age group, consistent with previous epidemiological studies [12-14].

Thyroid Lesion Classification:

The distribution of thyroid lesions across different age groups provided valuable insights into the prevalence and type of pathologies. Non-inflammatory lesions, particularly colloid and nodular goiter, were more prevalent than inflammatory lesions across all age groups. Benign lesions were more common compared to malignant lesions, with Hurthle cell adenoma being the most frequently observed benign tumour (16.4%) of the study cohort. Malignant thyroid lesions, although relatively rare, were predominantly detected in the 31-40 age group. The declining trend in the number of diagnosed cases beyond 50 years of age underscores the importance of age as a risk factor for thyroid disorders [15,8,10].

Correlation between Cytodiagnosis and Histodiagnosis:

The correlation analysis between cytodiagnosis and histodiagnosis provided valuable insights into the diagnostic accuracy of different thyroid lesions. While a high correlation was observed in non-neoplastic lesions, discrepancies were noted in inflammatory lesions, where cytodiagnosis failed to identify positive cases. In neoplastic lesions, although the correlation was slightly lower, considerable concordance was observed, particularly in Hurthle cell adenoma cases [1,5,9,11,16-19]. However, challenges persisted in detecting papillary carcinoma cytologically, highlighting the need for improved diagnostic approaches in such cases.

Surgical Interventions:

Surgical management tailored to the characteristics of thyroid nodules played a crucial role in patient care. Hemithyroidectomy was the preferred surgical approach for patients with solitary nodules experiencing compression symptoms. Total thyroidectomy was indicated for cases diagnosed with Hurthle cell adenoma or papillary carcinoma, ensuring optimal disease management and reducing the risk of recurrence [6].

Study limitations:

Despite providing valuable insights into the multidisciplinary evaluation and management of thyroid swelling, this study is not without limitations. Its retrospective design and reliance on single-center data may limit generalizability and introduce selection bias. Additionally, incomplete data, variability in diagnostic techniques, and subjectivity in clinical assessment may compromise the reliability of the findings. The study's sample size, while substantial, may not adequately represent rare thyroid pathologies, and limited long-term follow-up data hinder the assessment of treatment efficacy and disease recurrence. Ethnic and geographic considerations, potential confounders, and publication bias further underscore the need for cautious interpretation of the study results and highlight areas for future research refinement.

Conclusion:

In conclusion, this study provides valuable insights into the multidisciplinary evaluation and management of thyroid swelling, emphasizing the importance of a comprehensive approach in achieving accurate diagnosis and tailored treatment strategies. Further research is warranted to explore innovative diagnostic modalities and refine surgical interventions for improved patient outcomes in thyroid disorders.

References

- [1] Al-Shraim MM, Hussein MR, Musalam AO, Al-Ghandi T, Al-Zahramit H, Mahrouz AA, Abu-Eshy SA. Hurthle cell neoplasms of thyroid in south-western region of Saudi Arabia. *West Afr J Med*. 2010 Nov-Dec;29(6):398-402. doi: 10.4314/wajm.v29i6.68275.
- [2] Tüzün, Dilek, et al. Hurthle Cell Neoplasm of the Thyroid: Still a Dilemma?. *Turkish Journal of Endocrinology and Metabolism*, 2016, 20.2.
- [3] Chen, Herbert, et al. Hurthle cell neoplasms of the thyroid: are there factors predictive of malignancy. *Annals of surgery*, 1998, 227.4: 542-546
- [4] Lopez-penabad, Luis, et al. Prognostic factors in patients with Hurthle cell neoplasms of the thyroid. *Cancer: Interdisciplinary International Journal of the American Cancer Society*, 2003, 97.5: 1186-1194.
- [5] Carcangiu, ML., et al. Follicular Hurthle cell tumors of the thyroid gland. *Cancer*, 1991, 68.9: 1944-1953.

- [6] Chao TC, Lin JD, Chen MF. Surgical treatment of Hurthle cell tumors of the thyroid. *World J Surg.* 2005 Feb;29(2):164-8. doi: 10.1007/s00268-004-7669-9.
- [7] Cornianu, Marioara, et al. Proliferative activity of thyroid hurthle cell tumors. *Acta Endocrinologica-Bucharest-*, 2006, 2.3: 269.
- [8] Erickson, LA., Hurthle cell thyroid neoplasms. *Atlas of Endocrine Pathology*, 2014, 63-66.
- [9] Johnson, TL., et al. Hurthle cell thyroid tumors. An immunohistochemical study. *Cancer*, 1987, 59.1: 107-112.
- [10] Clark, DP.; FAQUIN, William C. Hurthle cell lesions. *Thyroid Cytopathology*, 2005, 88-102.
- [11] Miller, RH., et al. Hurthle cell tumors of the thyroid gland. *The Laryngoscope*, 1983, 93.7: 884-888.
- [12] Trimboli P, Durante C. Ultrasound risk stratification systems for thyroid nodule: between lights and shadows, we are moving towards a new era. *Endocrine* 2020. 69 1–4. (10.1007/s12020-020-02196-6)
- [13] Tang H, Schrimpf M, Lotter W, Moerman C, Paredes A, Ortega Caro J, Hardesty W , Cox D, Kreiman G. Recurrent computations for visual pattern completion. *PNAS* 2018. 115 8835–88. (10.1073/pnas.1719397115)
- [14] Hoang JK, Middleton WD, Tessler FN. Update on ACR TI-RADS: successes, challenges, and future directions, from the AJR special series on radiology reporting and data systems. *American Journal of Roentgenology* 2021; (216) 570– 57. (10.2214/AJR.20.24608)
- [15] Phuttharak W, Boonrod A, Klungboonkrong V, Witsawapaisan T. Interrater reliability of various Thyroid Imaging Reporting and Data System (TIRADS) classifications for differentiating benign from malignant thyroid nodules. *Asian Pacific Journal of Cancer Prevention* 2019, (20) 1283–128.
- [16] Mayson SE, Haugen BR. Molecular diagnostic evaluation of thyroid nodules. *Endocrinology and Metabolism Clinics of North America* 2019; (48) 85–97. (10.1016/j.ecl.2018.10.004)
- [17] Sun Y, Selvarajan S, Zang Z, et al. Artificial intelligence defines protein-based classification of thyroid nodules [published correction appears in *Cell Discov.* 2022 Sep 30;8(1):100]. *Cell Discov.* 2022; 8(1):85. Published 2022 Sep 6. (doi:10.1038/s41421-022-00442-x)
- [18] Sharma M, Mahore S. A Comparison of the Diagnostic Efficiency of Guided Fine Needle Aspiration Cytology Versus Conventional Fine Needle Aspiration Cytology of the Thyroid. *Indian J Otolaryngol Head Neck Surg.* 2019;71(Suppl1):152-156. (doi:10.1007/s12070-017-1163-9)
- [19] Noltes ME, Bader M, Metman MJH, et al. Towards in vivo characterization of thyroid nodules suspicious for malignancy using multispectral optoacoustic tomography. *Eur J Nucl Med Mol Imaging.* 2023;50(9):2736-2750.