Short Communication

A short communication on Oncocytic Lesions of the Thyroid gland

Gunvanti Rathod[1*], Banka Sai Swetha[2], Monica Mishra[3], Pragnesh Parmar[4]

[1]Additional Professor, [2,3]Senior Resident
Pathology and Lab Medicine, AIIMS, Bibinagar, Telangana, India
[4]Additional Professor and HOD
Forensic Medicine and Toxicology, AIIMS, Bibinagar, Telangana, India
[*]Corresponding author email: **neempath@gmail.com**

International Archives of Integrated Medicine, Vol. 12, Issue 5, May, 2025.
Available online at http://iaimjournal.com/
ISSN: 2394-0026 (P) **ISSN: 2394-0034 (O)**
Received on: 2-5-2025 **Accepted on:** 25-5-2025
Source of support: Nil **Conflict of interest:** None declared.

DOI: **10.5281/zenodo.15525906**

How to cite this article: Gunvanti Rathod, Banka Sai Swetha, Monica Mishra, Pragnesh Parmar. A short communication on Oncocytic Lesions of the Thyroid gland. Int. Arch. Integr. Med., 2025; 12(5): 9-12.

Abstract

Oncocytic lesions of the thyroid, often referred to as Hurthle cell lesions or oncocytic changes, represent a subset of thyroid pathologies characterized by mitochondrial-rich, eosinophilic cytoplasm. Oncocytic lesions of the thyroid are covering a wide spectrum of lesions e.g. benign hyperplastic nodules to malignant thyroid neoplasms. It is very important to understand their biology, diagnostic challenges, and management strategies for clinicians as well as pathologists alike. The most common clinical presentation of patients with oncocytic thyroid lesions is a painless thyroid nodule which is discovered incidentally or during evaluation for goiter or any other thyroid lesion. According to the WHO 2022 Classification of Tumors of Endocrine Organs, oncocytic lesions of the thyroid are recognized as a distinct subset of follicular-derived neoplasms. The WHO emphasizes the importance of rigorous histopathological criteria to differentiate benign from malignant oncocytic lesions and the need for molecular profiling to complement histological findings. Ongoing research will help to refine management approaches, principally for malignant oncocytic lesions. It is very much needed that endocrinologists, pathologists, and treating surgeons collaborate with each other for optimizing patient outcomes. This article emphasized on unique clinical, diagnostic, therapeutic and pathological aspects of oncocytic thyroid lesions.

Key words

Oncocytic lesions, Thyroid neoplasm, WHO 2022 Classification, Histopathological criteria.

Introduction

Oncocytic lesions of the thyroid, often referred to as Hurthle cell lesions or oncocytic changes, represent a subset of thyroid pathologies characterized by mitochondrial-rich, eosinophilic cytoplasm. Oncocytic lesions of the thyroid are covering a wide spectrum of lesions e.g. benign hyperplastic nodules to malignant thyroid neoplasms. It is very important to understand their biology, diagnostic challenges, and management strategies for clinicians as well as pathologists alike. In this article, we tried to explore the etiopathogenesis, findings on histopathology, clinical presentation, diagnostic modalities, and therapeutic approaches to oncocytic thyroid lesions, based by recent literature. Oncocytic lesions arise from thyroid follicular epithelial cells undergoing oncocytic metaplasia. There is increased mitochondrial content in the cytoplasm of the thyroid follicular epithelial cells which makes it Oncocyte. This change is believed to result from genetic and environmental factors. The most common genetic mutation includes alterations in mitochondrial DNA (mtDNA), the TERT promoter, and the RAS pathway. All these mutations are responsible for mitochondrial dysfunction, increased oxidative stress, and subsequent cellular transformation. Few Environmental factors may aggravate these processes, such as iodine deficiency and radiation exposure.

Clinical presentation and diagnostic modalities

The most common clinical presentation of patients with oncocytic thyroid lesions is a painless thyroid nodule which is discovered incidentally or during evaluation for goiter or any other thyroid lesion. Symptoms of compression, such as dysphagia or hoarseness, occur in larger lesions. Malignant lesions may present with regional lymphadenopathy or distant metastases, most commonly to the lungs and bones. There are many diagnostic modalities for any oncocytic lesion of thyroid e.g. Ultrasound, Fine Needle Aspiration Cytology (FNAC), Molecular Testing and Histopathology. Oncocytic lesions typically appear as hypoechoic, solid nodules with microcalcifications and irregular margins. FNAC is very easy and cost-effective tool to diagnose various thyroid lesions [1-3]. FNAC reveals abundant oncocytic cells but struggles to distinguish benign from malignant lesions due to overlapping cytological features. Mutational analysis for RAS and TERT promoter mutations aids in risk stratification and prognosis. Histopathological examination is the gold standard for the final diagnosis and assessment of capsular and vascular invasion is critical for distinguishing benign from malignant forms [4]. On Histopathological examination, oncocytic cells are large, with abundant granular eosinophilic cytoplasm and centrally located, round nuclei. The most important differentiating feature for Oncocytic follicular carcinomas from adenomas is the presence of capsular and vascular invasion. Moreover, oncocytic variants of papillary thyroid carcinoma have been identified, exhibiting the nuclear features of papillary carcinoma along with oncocytic cytoplasm [5]. Electron microscopy confirms the mitochondrial richness, while immunohistochemistry may reveal markers such as TTF-1, thyroglobulin, and mitochondrial proteins.

Updates about oncocytic lesions according to WHO 2022

According to the WHO 2022 Classification of Tumors of Endocrine Organs, oncocytic lesions of the thyroid are recognized as a distinct subset of follicular-derived neoplasms. The WHO emphasizes the importance of rigorous histopathological criteria to differentiate benign from malignant oncocytic lesions and the need for molecular profiling to complement

histological findings [6]. Key updates are as following:

1. **Terminology:** The term "Hurthle cell" is increasingly replaced with "oncocytic" to align with the broader spectrum of oncocytic changes.
2. **Oncocytic Follicular Adenoma (OFA):** Defined as a benign, encapsulated neoplasm composed of more than 75% oncocytic cells without capsular or vascular invasion.
3. **Oncocytic Follicular Carcinoma (OFC):** Diagnosed by the presence of capsular or vascular invasion in a tumor predominantly composed of oncocytic cells.
4. **Oncocytic Variants of Papillary Thyroid Carcinoma (OV-PTC):** Highlighted as a distinct entity with overlapping features of classic PTC but dominated by oncocytic cytology.

Management Strategies and Prognosis

The management of oncocytic thyroid lesions depends on their nature. In case of benign lesions, conservative management with regular ultrasound monitoring is sufficient e.g. hyperplastic nodules and adenomas don't require surgical interventions in each and every case [7]. Surgical resection, typically total thyroidectomy, is the cornerstone of treatment in case of Oncocytic Follicular Carcinoma and OV-PTC. Role of Radioactive Iodine (RAI) Therapy is having limited role due to poor iodine uptake by oncocytic cells. Targeted Therapy is considered emerging options, such as tyrosine kinase inhibitors (TKIs), show promise in advanced, refractory cases. Oncocytic Hyperplasia and Adenomas are having **e**xcellent prognosis with minimal risk of progression [8, 9]. However, in case of Oncocytic Follicular Carcinoma and OV-PTC**,** prognosis depends on the extent of invasion and metastasis [10]. In contrast to the favorable outcome seen in early-stage disease, advanced stages often exhibit higher recurrence and mortality rates.

Conclusion

Oncocytic thyroid lesions present a unique clinical, diagnostic, therapeutic and pathological challenge. Advances in molecular biology and imaging have enhanced diagnostic accuracy and informed therapeutic strategies. Ongoing research will help to refine management approaches, principally for malignant oncocytic lesions. It is very much needed that endocrinologists, pathologists, and treating surgeons collaborate with each other for optimizing patient outcomes.

References

1. Gunvanti Rathod, Pragnesh Parmar. Fine needle aspiration cytology of swellings of head and neck region. Indian Journal of Medical Sciences, 2012; 66: 49-54. PMID: 23603620. DOI: 10.4103/0019-5359.110896
2. Gunvanti Rathod, Sangita Rathod, Pragnesh Parmar, Ashish Parikh. Diagnostic efficacy of fine needle aspiration cytology in cervical lymphadenopathy – A one year study. International Journal of Medical and Pharmaceutical Sciences, 2014; 4(5): 1-8.
3. Mobeen Alwani, Gunvanti B. Rathod. Diagnosis of anaplastic thyroid carcinoma on fine needle aspiration cytology – A rare case report. IAIM, 2015; 2(3): 183-187.
4. Berho M, Suster S. The oncocytic variant of papillary carcinoma of the thyroid: a clinicopathologic study of 15 cases. Hum Pathol., 1997 Jan; 28(1): 47-53. doi: 10.1016/s0046-8177(97)90278-1. PMID: 9013831.
5. Straccia P, Santeusanio G, Pierconti F, Brunelli C, Fadda G. Cytologic Diagnosis of Oncocytic Neoplasms of the Thyroid Gland: The Importance of the Clinical Scenario. Appl Immunohistochem Mol Morphol., 2019 Nov/Dec; 27(10): 726-731. doi:

10.1097/PAI.0000000000000713. PMID: 30358610

6. Lloyd R. V., et al. WHO Classification of Tumours of Endocrine Organs. IARC, 2022.
7. Ganly I., et al. Hurthle Cell Carcinoma of the Thyroid: A Clinicopathologic Study of 188 Cases. Cancer, 201; 119(4): 504-511.
8. Nikiforov Y. E., Nikiforova M. N. Molecular Genetics and Diagnosis of Thyroid Cancer. Nature Reviews Endocrinology, 2011; 7(10): 569-580.
9. Cameselle-Teijeiro J. M., et al. Hurthle Cell Tumors of the Thyroid: A Comprehensive Review. Endocrine Pathology, 2015; 26(2): 91-99.
10. Xing M. Molecular Pathogenesis and Prognostic Markers of Thyroid Cancer. Nature Reviews Cancer, 2013; 13(3): 184-199.